The Mining Journal

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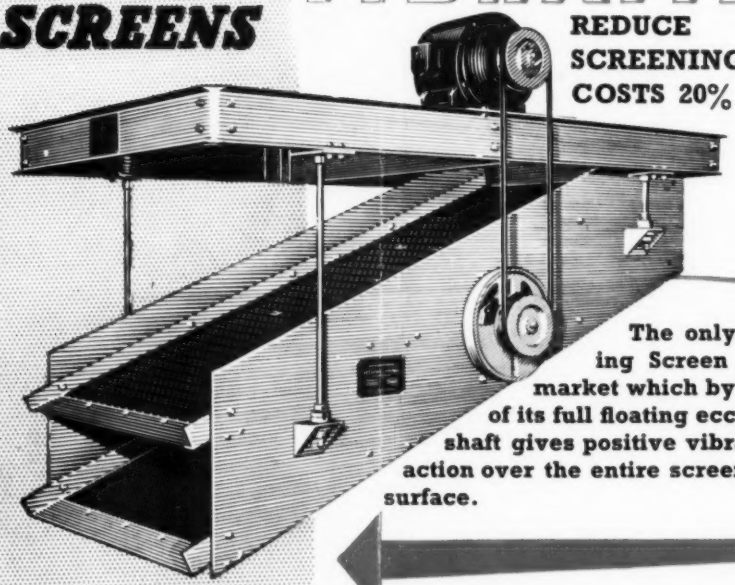

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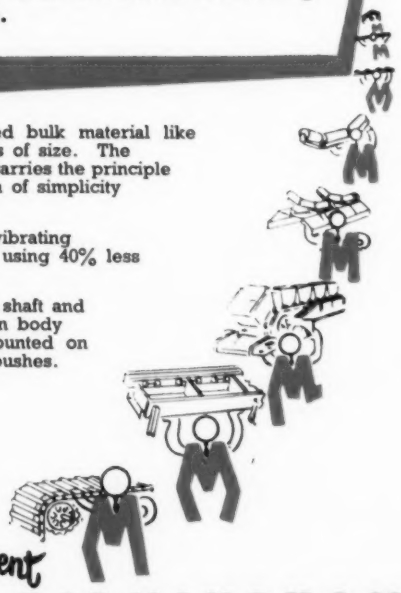

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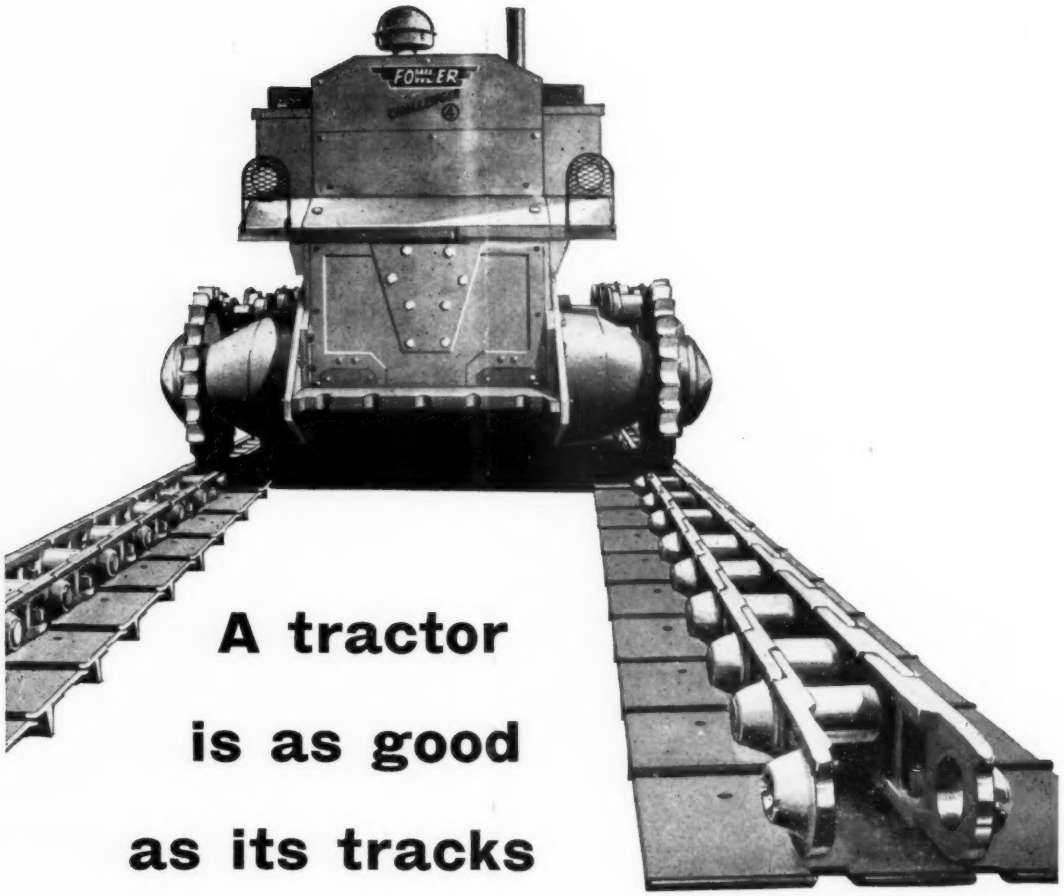

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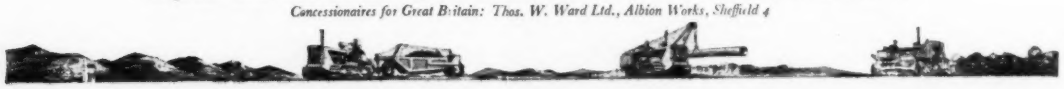

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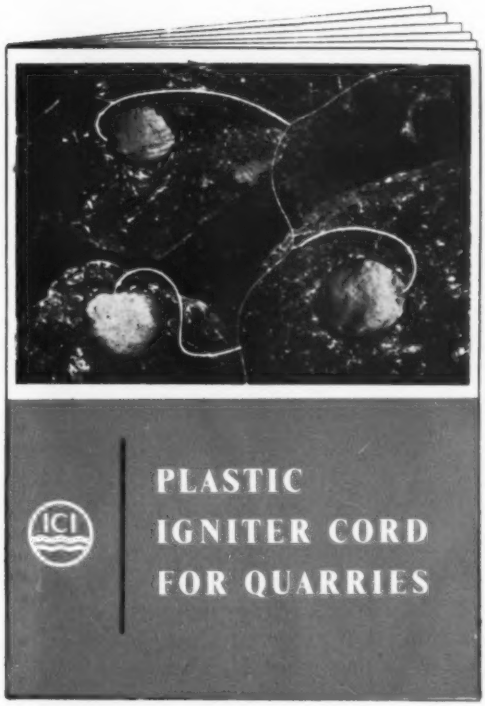

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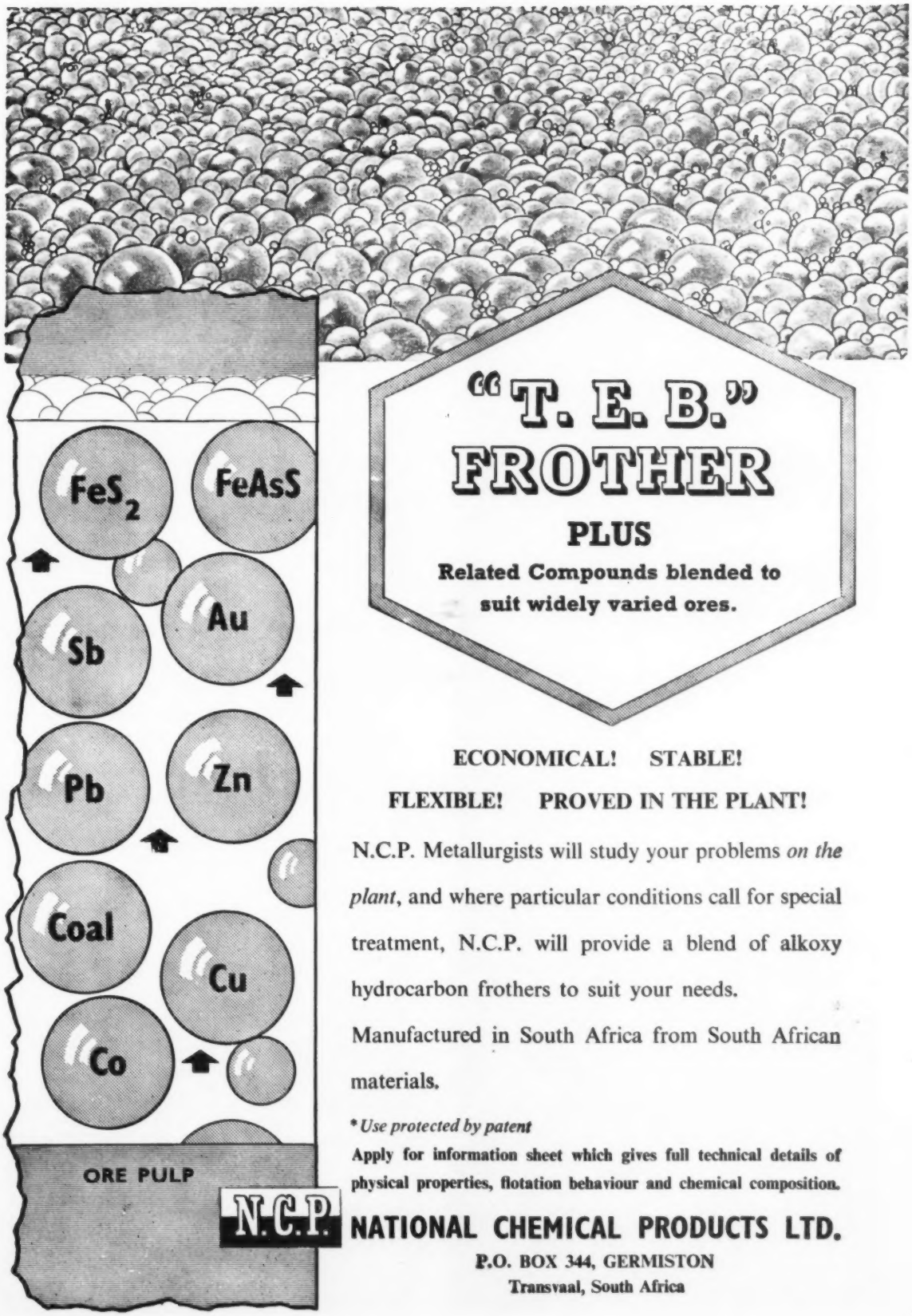

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DRILLING SOME OF THE HARDEST ROCK IN THE WORLD

Atlas Copco drills and Sandvik Coromant steels brought in to do the job at the Orkla pyrite mine, Norway

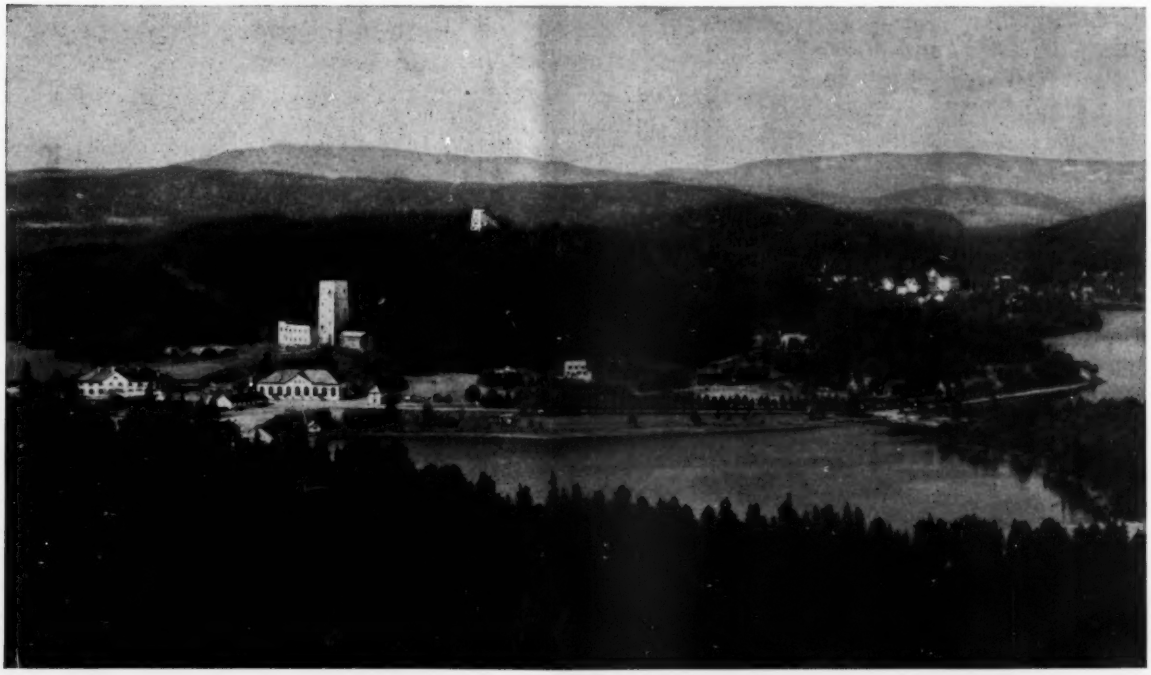
The Orkla pyrite mine is by far the largest of its kind in Norway and has been in operation for 300 years. About 350,000 tons of the ore are mined annually, most of it going to the Orkla metallurgical plant producing elementary sulphur and copper matte.

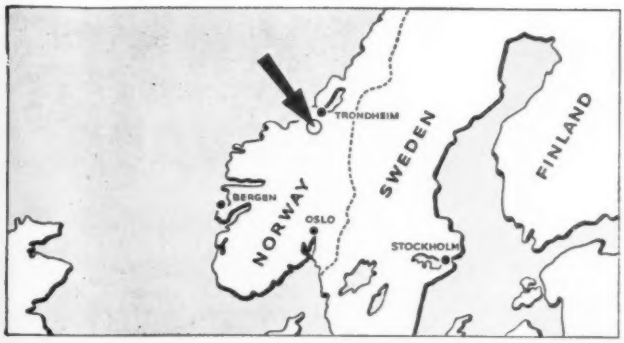
The Orkla pyrites are a fine-grained tight structure and contain finely-distributed quartz. The ore is exceptionally hard; *said to be the most difficult in the world to drill.* Over the years, 90 different types of rock drills and numerous grades of drill steels have been tested in the mine. The most recent and most successful have been special Atlas Copco rock drills fitted with Sandvik Coromant tungsten-carbide-tipped steels. *These drills have now been adopted throughout the Orkla mine.*

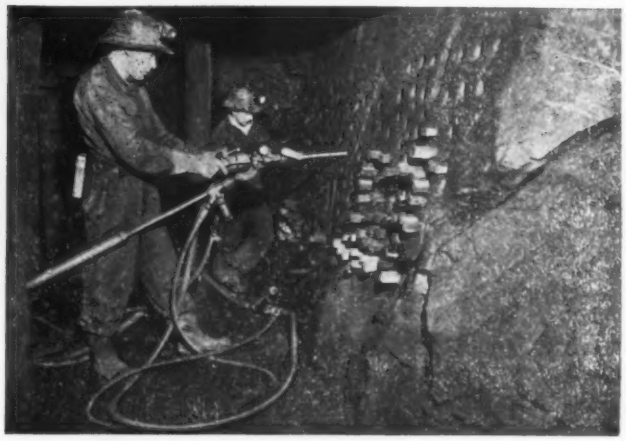
The drilling technique at the Orkla mine previous to the introduction of tungsten-carbide drilling was based on the use of one-inch hexagonal hollow carbon steels with 6-point star bits and 134-pound stopers mounted on columns. Progress was anything but smooth. Seizures were often experienced and drill steel wear was considerable. Over one ton of steels was used per machine to drill a five-foot round, requiring about 400 steels altogether. Again, one steel was redressed per ton of raw ore produced, and up to 24 drillsmiths and 12 haulers were engaged on this work.

Revolutionary change of method

There is no doubt about it at all. Tungsten-carbide drilling —the combination of Atlas Copco drills and Sandvik Coromant steels — has completely modernised and speeded up production at the Orkla mine. First tests with







Above: *Stoping at the Orkla mine with an Atlas Copco rock drill and a Sandvik Coromant tungsten-carbide-tipped steel. This equipment has now been adopted extensively throughout the mine.*

Right: *The Atlas Copco drill specially developed for the Orkla pyrites being tested down the mine.*

tungsten-carbide steels gave advances of ten inches after each regrind and a total footage of fifty inches per steel. The steels were then modified to suit local conditions and, in addition, Atlas Copco also got to work developing a special rock drill, the BBE 12DK, for the Orkla pyrites. This machine weighs only 54 pounds, is mounted on a pneumatic pusher and has a striking power of 4,800 one-inch blows per minute.

Now, steels go 50 feet in hard rock

The special Atlas Copco drills and Sandvik Coromant steels were finally introduced extensively throughout the Orkla mine in 1953 after footages of as much as fifty feet had been obtained per steel. Today, the steels go 2.6 feet or more before a regrind and equipment in the redressing shop has been reduced to 4 grinders and 3 haulers. Standard Atlas Copco drills fitted again with Sandvik Coromant steels have also been adopted for drilling jasper, which occurs in the Orkla mine. Here too, Atlas Copco equipment and drilling methods have scored another great success. In greenstone, the predominant rock, footages up to 1,000 feet per steel have been obtained.

The outstanding performance put up by Atlas Copco drills and Sandvik Coromant steels at Orkla is being repeated again and again on mining and construction projects all over the world. This equipment is in such wide use that it is responsible for the drilling of no less than one billion feet annually!

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NOTES AND COMMENTS

"Know-How" for Sale

During the past decade the American mining expert, with his team of technologists and scientists, has become as ubiquitous as uranium minerals. The U.S. contribution to the development of the Free World's natural resources and the expansion of its mining industry is on a scale which the U.K., with its limited resources of capital and trained manpower, can no longer attempt to emulate. There has lately been increasing evidence, however, that the challenge to Britain's former supremacy as an exporter of mining "know-how" is by no means confined to the U.S.

The Japanese government was recently asked to supply 15 mining experts for technical assistance in the development of Bolivia's mineral resources. This request followed the visit of a Japanese mining survey team to Central and South American countries, where tin, antimony, lead and zinc mines were prospected. Hitherto mining experts in Bolivia have been predominantly British.

Last year a team of Russian oil and mining experts visited India by invitation of the government. The oil experts toured Assam, Bihar, West Bengal and the U.P., while mining engineers visited the Panna Diamond Mines in Vindyha Pradesh. It was reported that the team might investigate the possibility of setting up manufacturing units for petroleum drilling rigs and mining equipment.

As might be expected, Germany is again an active and very formidable competitor in the world market for mining "know-how". In Greece, for example, the principal mining project is the development of the Ptolemais lignite coal deposit in Western Macedonia, with reserves estimated at some 250,000,000 tonnes. This project is being undertaken with West German financial and technical assistance. The scheme envisages the erection of a briquette works of 200,000 p.a. capacity, a carbonization plant, a nitrate fertilizer plant, and a thermal power station burning lignite. The cost of the initial stage is estimated at $20,000,000.

These examples, drawn from three different continents, are sufficient indication of the world-wide struggle being waged by exporting nations for the role of guide, mentor and benevolent uncle to governments which have come to realize that the development of mineral resources is the first step along the road that leads to higher living standards. The sale of "know-how" might be described as the very spearhead of the export drive, since the experts who find and evaluate deposits of commercial value, prepare schemes for their development, and indicate ways and means of raising the necessary finance, are in a unique position to further the commercial interests of their own countries when orders for machinery and equipment are ultimately placed.

British "know-how" and capital have played a key part in opening up many of the world's richest mining fields, from South Africa to Brazil and from the Kolar goldfield to Kalgoorlie's "Golden Mile". Since the second world war the mining industry has been expanding at a rate which has never previously been approached. Yet, with a few notable exceptions, British participation has been confined largely to Africa south of the Equator. It is understandable, though none the less regrettable, that in present circumstances we cannot play our traditional role as the world's largest exporter of mining capital, but there is no shortage of British brains and "know-how," as experience in other industries clearly shows.

In the face of keen international competition, especially from the U.S. and Germany, a British firm, Associated Electrical Industries, was recently appointed as consultants in a major project to create a heavy electrical manufacturing industry in India. In the development of nuclear power generation the importance of Britain's contribution is qualitatively unexcelled and quantitatively exceeded only by that of the U.S. (and possibly by that of the U.S.S.R.). British civil engineering firms have formed consortiums and are securing valuable contracts in Commonwealth and other countries.

Why, then, should we be content to sit back and watch our competitors take the lead in the export of mining "know-how" to countries such as India and Bolivia, which still offer rich opportunities for British skill and knowledge? One of the main causes for this apparent lack of enterprise is the gradual extinction of the small independent professional mining consultant, who has been the victim of heavy taxation, high costs and fluctuating prices on the one hand and the trend towards larger units on the other. The development of the group system and the growth of large company units have alone made possible the vast

scale of modern mining operations, which is indispensable to a civilization which bases its economy on mass production. It is evident, however, that the activities of one large unit, however flexible and diversified, are bound to be more concentrated than those of many independent professional men operating on their own account, whose oyster is the world.

The advent of geophysical techniques has given a new life to the independent consulting geologist, but, here too, the effects of the group system have, in some respects, been centripetal rather than centrifugal, since clients are for the most part large mining companies or governments. Moreover, the large mining company unit is tending increasingly to rely on geological advice obtained from its own permanent staff.

How, then, are the benefits of large-scale organization to be achieved without eliminating the small independent consultant. "There can be no quibble," said Dr. D. M. Davidson not long ago, "about the fact that a consultant is more hungry than his colleague who is sheltered in the security of a permanent job and looks forward to a pension. His imagination will be bolder and freer, the challenge to him is greater, and he will thus often respond in higher manner to this challenge than his permanently employed counterpart."

The remedy, of course, lies not in starving the consultant to whet his imagination and initiative, but rather in providing conditions which will make it possible for him to retain his independence without financial sacrifice. One possible solution might be the establishment of a consortium of professional consultants, financed by the larger mining units and/or exporters of mining machinery and equipment, which would have as its prime objective the export of mining "know-how". We are convinced that the cost of maintaining an army of unattached consultants—the "paratroopers of the mining industry"—to disseminate "know-how" throughout the world would be recovered over and over again in the form of mineral discoveries which would provide favourable opportunities for British participation and exports.

We are not, of course, unmindful of the fact that the export of capital is often an essential prerequisite for providing the entrée for the subsequent admission of technical experts. But even so, this is too often used as an excuse rather than held up as a challenge—a challenge which this country cannot ignore with impunity.

Aluminium as an Atomic Material

The aluminium industry in the U.S. appears to be displaying little anxiety as to the outcome of the demands presented to primary producers by the United Steelworkers. On the other hand, the possibility is foreseen that the demand for aluminium might be considerably increased if the nation-wide steel strike persists. This prospect is by no means wholly pleasing to producers and fabricators of the light metal, who are agreed that the aluminium industry has much to lose from a steel strike lasting three months or more.

The industry has become much less sensitive to shortages in other metals, because fabricators and users have come to understand in just what applications aluminium is the right metal and in what uses it is the wrong metal. There is no possibility of the hysterical substitution of aluminium for steel that went on during the steel shortage of 1948. Though a prolonged steel strike would lead to the substitution of aluminium for certain parts traditionally fabricated of steel, fabricators producing goods that use both steel and aluminium would have to halt production, thus reducing the demand for aluminium.

The aluminium industry is obviously more interested in developing and expanding applications likely to offer permanent outlets than in temporary substitution. Among the most promising of these newer fields is atomic power generation. It has been reported that the development of new types of aluminium alloys has been a major contribution to Britain's progress in nuclear plant design.

In the U.S. Alcoa has announced that boral, a neutron-shielding material vital to atomic energy installations, is now available commercially in the largest plate and sheet sizes ever produced in this material. Bearing a name coined from its ingredients—boron carbide and aluminium—boral was developed and fabricated initially on a limited basis by the Atomic Energy Commission. Growing educational and commercial applications involving reactors have created sufficient demand to warrant commercial manufacture.

Australia

(From Our Own Correspondent)

Melbourne, June 30.

Beach sand mining, for the recovery of rutile and zircon, continues as the most popular phase of Australian mining. All eastern coast beaches, and many back areas where ancient strand-lines exist, or are suspected, are under examination under Authorities to Prospect, or Lease Applications, and the search has extended to Tasmanian beaches. Western Australia promises to be a source of commercial ilmenite, and some attention is being given to lode deposits containing rutile, in two districts in Queensland.

It is generally accepted that a distance of 200 miles along the adjacent coasts of New South Wales and Queensland is the richest rutile-zircon bearing area in the world; extensions to north and south are also being opened up. The Minister for National Development has stated that production from these areas should extend from 10 to 20 years. The rate of production has been steadily increasing since 1934, and in 1955 the total value of Australian rutile and zircon reached £A3,631,495.

In 1955, the State of Queensland produced 35,600 tons of the two minerals, worth £A1,154,157. In contrast to the Eastern Coast ilmenite, Western Australian ilmenite is practically chrome-free, and a large company is about to commence production near Bunbury.

WESTERN AUSTRALIAN GOLD

The State's gold production for the five months to May 31, was 348,925 f.oz., a decrease when compared with the same period of 1955, when the output was 362,424 f.oz. At the moment no definite reason for the fall can be given. Development at Central Norseman Gold Corporation continues satisfactorily, being mainly centred in the Crown Reef, where, at No. 16 level, the south drive is following strong reef, assaying 5.5 dwt. for a distance of 67 ft., the width being 64 in. A rise from this level is up 49 ft. in values averaging 19.3 dwt. over 64 in. At No. 11 level off the Regent Shaft, 36 ft. of driving assayed 5.9 dwt over 48 in.

Great Western Consolidated has reported good results from Fraser's Mine, Southern Cross, where a diamond drill bore at No. 5 level, put out from the west crosscut, met the lode at 35 ft., assaying 3.9 dwt to 40 ft. and from 44 ft. to 54 ft. 5 in. 11.6 dwt; a second borehole from the same set-up, gave an assay of 12.2 dwt from 71 ft. 9in. to 73 ft. 3 in. and 11.5 dwt. from 100 ft. to 105 ft. This mine promises to be important to Great Western Consolidated.

Blueprint for the Gold Coast

The Preparatory Commission set up by the U.K. and Gold Coast Governments to study the Volta River Project reports that the scheme is technically and economically sound and would bring its greatest return if maximum production were achieved as soon as possible. The detailed results of the Commission's work are set out in a three-volume report published this week by Her Majesty's Stationery Office.

The Volta River Project for hydro-electric development and aluminium production in the Gold Coast was described in *The Mining Journal* of December 5, 1952 (pp. 641 and 642). It envisages a dam across the Volta River, a power station capable of generating about 600,000 kW. and a smelter that would use the greater part of this power for the manufacture of aluminium from very large bauxite deposits in the Gold Coast.

Earlier investigations into the project led to discussions in 1952 between the British and Gold Coast Governments and two companies, Aluminium Ltd. of Canada, and the British Aluminium Company. It was then agreed that the two governments would jointly set up a Preparatory Commission to examine the scheme comprehensively. The Commission started work in 1953 and its report (price £1 15s.) sets out the results of the investigations that have since been undertaken. More detailed information about certain aspects of the Commission's work is contained in a companion volume of 16 appendices (price £5 10s.). A third volume (price £8 15s.) is devoted to the engineering aspects of the proposed dam and power installation and of the railways needed for the project.

ALL ASPECTS THOROUGHLY EXAMINED

It is evident from the report that the Commission has carried out a very thorough and comprehensive investigation into every aspect of the project. It has sought to take advantage of knowledge and experience gained from major projects in other parts of the world, by consulting the foremost experts in every field. Men of such calibre as Dr. Arthur E. Morgan, first chairman of the Tennessee Valley Authority, and Professor W. Arthur Lewis, Stanley Jevons Professor of Economics at Manchester University, were invited to visit the Gold Coast and their advice was available to the Commission.

There is good reason to believe that the Volta River project has been investigated more carefully and comprehensively than any other project of similar magnitude in the world. As a matter of policy, the Commission has invariably adopted a very conservative attitude in analyzing every aspect. No optimistic assumptions have been made.

The report constitutes both a complete analysis of the scheme and a detailed blueprint for putting its recommendations into effect. If the governments concerned decide to proceed with this bold and imaginative project, they can do so with the knowledge that it has been thoroughly planned before its execution is begun. Every effort has been made to assess realistically what the final costs will be, and so avoid the blunders associated with certain other no less ambitious schemes for colonial development which proved to be costly white elephants, largely because they were launched without adequate investigation and pre-planning.

CONSTRUCTION AND ECONOMICS

The Commission's estimates indicate that the cost of power from the project should be competitive with that generated from any other scheme recently constructed or now under consideration in other parts of the world. Construction of the dam and power installation would take seven years with work going forward in continuous shifts. If work were to start in 1957, power should be available from 1964 onwards. Facilities at the port of Tema are expected to be available in good time to help with handling materials and plant needed for construction. The proposed timetable could only be achieved provided the future development plans of the Gold Coast were not excessive and were most carefully co-ordinated with the requirements of the project. The Gold Coast Government has informed the Commission that this would be done.

Whereas the White Paper of 1952 estimated that the project would cost approximately £100,000,000 at the initial stage (to produce 80,000 tons of aluminium a year) and £144,000,000 by the final stage (210,000 tons), the Commission's Report places the cost at about £160,000,000 at the initial stage and £230,000,000 at the final stage, based on prices ruling at September 30, 1955. Interest has been calculated at 5 per cent. On these figures the average cost of all power supplied at the final stage would be just under a fifth of a penny per unit.

The Commission's investigations have shown that about 10 per cent more power could be obtained from the project than was previously thought possible. After providing over 500,000 kW. for the aluminium companies, there would still be ample reserves available to the Gold Coast Government for other purposes for many years to come.

THE "HUMAN FACTORS"

A fact which emerges very clearly from the report is that the Volta River Project is not merely a vast construction task, a project for controlling waters and providing hydro-electric power, a mining scheme, or a plan to produce vast quantities of aluminium within the sterling area. It is all of these things, but it is also something more. Of even greater importance than the technical and economic aspects are the "human factors"—i.e., the great range of problems associated with the development and maintenance of stable and efficient labour forces for long periods in the tropics.

The Commission's enquiries into all the problems affecting the labour forces are recorded in Appendix XII to the report. Social and racial relationships have been analysed thoroughly and all parties to the project are agreed that every aspect of the scheme should be planned and carried out without reference to race, creed or colour. The policy advocated thus sets a pattern for the association of the white man and the indigenous African to their mutual advantage, which has implications reaching far beyond the Gold Coast's borders. The Commission's approach to this basic problem of labour relations in a multi-racial community and, indeed, its very conception of the problem, is diametrically opposed to the outlook and policy of the present South African Government.

All parties to the project are agreed that the International Bank for Reconstruction and Development should now be invited to indicate the extent to which it would be willing, in principle, to participate in the scheme. If agreement on the framework could be reached between the two governments and the aluminium companies, the next step would be for its terms to be debated in the Legislative Assembly of the Gold Coast. No agreement would be signed until the debate had taken place.

Industrial Relations in a Multi-racial Society

Fundamental problems of labour-relations in the multi-racial societies of South Africa and the Central African Federation were reviewed by Mr. H. F. Oppenheimer in a speech delivered at H.R.H. The Duke of Edinburgh's Study Conference on July 25, from which the following observations are extracted. By presenting the issues clearly and simply Mr. Oppenheimer's address, though it offers no simple solutions, will assist investors and others, to whom the realities of these problems often seem obscure, to view them in better perspective in relation to the broad canvas of mining and industrial expansion in Southern Africa.

The proper objective of policy in Southern Africa, believes Mr. Oppenheimer, is to secure the economic, cultural and social development of all the races concerned to the full extent of their capabilities in a manner which will not adversely affect the high standards already established for the Europeans. This objective can only be attained by co-operation between the races in all spheres of the national life.

What are the factors which create the strains and difficulties that face us in this task? The first is race-consciousness as such: the belief of most Europeans in the importance of purity of race, combined with an unquestioning faith in the intrinsic superiority of the race to which they happen to belong. Africans are just as deeply affected as Europeans and an unfortunate feature is their inability to see any problem except in racial terms.

The next factor, and it is of the greatest importance, is that the Africans of Southern Africa are on the whole still an extremely primitive people. Their way of life often appears strange—and sometimes unattractive—to Europeans, and no doubt the reverse is true. The advancement of the Africans can only take place if the African way of life and thought is abandoned in favour of a state and society built on European foundations. Till Africans are able to become an integral part of an entirely different sort of society, which will take many years, it will be essential to maintain, not necessarily by law but by custom, a substantial measure of social and residential separation.

A third factor is the fear of the European workers that African labourers, working for low wages, may break down their high standard of life. This is at the base of the so-called "economic colour bar," by which African labour is confined, either by law, by pressure from the White trade unions, or by custom, to unskilled labour. The fears of the European workers are not groundless and if African progression is to go forward, they must be met.

THE INDUSTRIAL COLOUR BAR

In South Africa the expressed policy of the government is to maintain the industrial colour bar and to limit the Africans to unskilled work in what they call the "White areas" of the country. On the other hand they propose to help them to develop to the full, free from White competition, in the "African areas". No doubt the plan has theoretical attractions, but the practical difficulties are considerable.

Where the industrial colour bar is not enforced by law, it is often enforced by European trade unions, either directly or by the manner in which the sound principle of the "rate for the job" is applied. This last approach is particularly favoured in the Rhodesian Federation, where government policy and public opinion generally are opposed to an industrial colour bar as such.

African labour, except at simple repetitive jobs, is on the whole much less efficient than European labour. In these circumstances, if the White trade unionists rigidly insist that there must be no "dilution" of labour, no "fragmentation" of processes to make room for intermediate grades of workers, and that if Africans do skilled jobs they must receive precisely the same conditions, rates of pay, provision for housing, social amenities and so forth as are customary for Europeans, the effect must be completely to exclude Africans from all but unskilled work.

Nevertheless the principle of the "rate for the job" is sound and its maintenance is the only way to give proper security to the White workers. But if it is to be maintained, the White workers must be prepared to agree to rates being fixed in such a way as in practice to make increasing numbers of skilled jobs available to the Africans.

AFRICAN ADVANCEMENT ON THE COPPERBELT

This has happened on the Copperbelt, where 24 categories of jobs previously done by Europeans have, by agreement with the White union, been handed over to Africans. Wages and conditions for these jobs have been fixed considerably below those normally received by Europeans, but considerably above those obtained in the past by Africans. In theory all jobs on the copper mines are open to Black and White, but in practice certain jobs are regularly done by Europeans and others by Africans, and the division is marked by a substantial wage differential. This arrangement corresponds with the economic and social facts of the situation as they exist to-day. Gradually the gap between European jobs and African jobs will be bridged until the present sharp distinction becomes blurred and, perhaps finally disappears. The speed of advance will depend on many factors: the skill and sense of responsibility shown by the Africans and, at least as important, their standards of living and culture; the condition of the national economy; the prosperity of the copper mining industry, and, finally, the state of mind of the European workers.

The step that has been taken on the Copperbelt is notable because the mining industry there and in the Union is, for historical and technical reasons, the field in which the present inter-racial pattern is most rigidly set. But it is in secondary industry, where techniques are more fluid and where there is a wide field of semi-skilled jobs, not regarded as essentially either "White" or "Black," that the most rapid advance has taken place. In Rhodesia the number of Africans in secondary industry increased by 100 per cent between 1941 and 1953. Many earn good wages. Some book-keepers and clerks earn from £420 to £720 per annum, lorry drivers up to £480 per annum, and so on. In the Union, where the economy is more developed, nearly 500,000 Africans are employed in factories. While most do unskilled work, increasing numbers are in semi-skilled and skilled occupations and earn good wages—some as much as £15 a week.

In spite of the government in South Africa being committed to a policy of separation, more and more Africans are becoming detribalized and urbanized. The fact is that economic pressure works all the time to secure co-operation between the races, because that is the only way to develop the great undeveloped areas of Southern Africa and to raise the general standard of life.

The essential multi-racial character of Southern Africa cannot now be changed. Our choice is not whether Black and White should live together or not, but whether living together we should quarrel or co-operate.

Copper Mining Expansion in Peru

Extensive copper deposits, estimated at one billion tons, are to be developed in the Toquepala district near Ilo, Peru. Work has already begun on port construction for ocean-going vessels, although more than four years will elapse before actual copper production is realized from any of the three deposits involved, namely from the mines at Toquepala, Quellaveco and Cuajone. Operations are being carried out by Southern Peru Copper Corporation, formed to work open pit mining operations by American Smelting and Refining Company, Cerro de Pasco Corporation, Newmont Mining Corporation, and Phelps Dodge Corporation. It is estimated that a total of $200,000,000 will be spent on bringing the Toquepala deposit into production. This estimated expenditure does not include the Quellaveco and the Cuajone deposits. The initial stages of the project are described in the following article.

Initial construction operations for the copper mining expansion project started with the amphibious landing of equipment at Ilo, Peru. A total of five Caterpillar DW21 and Athey PR21s, one Caterpillar D9 diesel tractor, two D8 diesel tractors, one Caterpillar No. 12 and one Caterpillar No. 112 Motor Grader, two Caterpillar diesel D318 electric sets and one Caterpillar No. 955 Traxcavator were landed for building the port facilities.

Port construction consists primarily of a 900 ft. rock approach which ends in a 600 ft. concrete pier. About 500,000 tons of rock (granetoid weighing about 4,400 lb. per cu. yd.) has to be hauled over half a mile from a quarry. A storage area is also being prepared.

INITIAL OPERATIONS

The Toquepala mine, estimated to contain over 400,000,000 tons of low grade ore, lies 56 miles inland and is expected to produce 140,000 tons of blister copper annually for 10 years. In the same district, the mines of Quellaveco and Cuajone are estimated to contain 200,000,000 and 500,000,000 tons of ore respectively. These three orebodies contain over one billion tons of ore running approximately one per cent copper. Before copper production can start at the Toquepala mine, however, 126,000,000 tons of overburden will have to be removed.

This phase of the project is expected to take four and a half years of work around the clock. Electric power shovels will dig out the overburden and load into road hauling units. Haul lengths will vary from 5,000 ft. to 8,000 ft., one way.

Besides the removal of overburden, a smelter, steam power plant, concentrator, roads, railroads, homes and other facilities will have to be completed. A temporary diesel power plant of 6,475 kW. will be needed to supply initial power for the electric shovels. Transmission lines and sub-stations will also be constructed.

A Marion 4 yd. shovel loading a DW21-Athey PR21 unit during construction operations

Plans have been developed for a standard gauge railroad about 130 miles long through very rugged country to connect the concentrator with the port. The railroad will actually traverse a distance "as the crow flies" of only 56 miles. But this is only one of the major difficulties involved, for the Toquepala district has virtually no rainfall at all. Water, therefore, will be transported by pipeline and aqueduct over a distance of 50 miles. There will be a storage reservoir of several days' capacity for emergencies.

Located at an elevation of 10,600 ft. in the Andes mountains, the Toquepala mine will have complete tyre, machine, washing and painting shops to service all equipment. There will also be mobile repair shops. It is fully expected that initial employment may reach a peak of 4,500 employees during construction.

A landing jetty being constructed by a Cat D8 at Ilo.

Expansion of Mineral and Metal Production in the U.S.S.R.

For many years Russia's contributions to world production of metals and minerals have been represented in statistical tables by question marks or by asterisks denoting "guesstimates". Recent statements by Soviet leaders have allowed some of the gaps to be filled, or have at any rate provided a basis for more accurate estimations. This article should be read in conjunction with a review of the Soviet Union's sixth Five-Year Plan, published in our issue of May 11, 1956, p. 579.

It is claimed that the targets for the fifth five-year plan for raising industrial output, calling for an increase of approximately 70 per cent within the five-year period, were fulfilled ahead of schedule in four years and four months. In the iron and steel industry the targets for the production of steel and rolled metal were surpassed, but those for pig-iron output were not quite reached. In 1955 production included 33,000,000 tons of pig iron, 45,000,000 tons of steel, and 35,000,000 tons of rolled metal. Production of thick sheet steel increased by 88 per cent, that of stainless sheet steel by 180 per cent, and transformer steel by 130 per cent. During the five-year period about 150 new brands of steel were introduced into production.

Work continued at iron and steel plants on the intensification of metallurgical processes, automation of metalworking plant, and mechanization of labour-consuming jobs. The average daily production of steel per sq. m. of hearth at open-hearth furnaces increased by 22 per cent. At the same time, the use of oxygen for the intensification of metallurgical processes developed slowly and complex mechanization of mining work was inadequately introduced.

The iron and steel industry continued to develop in the south, the Urals, Siberia and the central areas, and also in districts in the Transcaucasus and the north. In the main, construction was completed of the Transcaucasian iron and steel works and the Baku tube-rolling plant, while the first blast furnaces were put into operation at the Cherepovets metal works and the Orsk-Khalilovo iron and steel mill.

THE NON-FERROUS METALS

Production of non-ferrous metals during the fifth five-year plan period increased very greatly. Output of refined copper in 1955 was 53 per cent above that of 1950, aluminium 180 per cent, lead 130 per cent, zinc 100 per cent, and nickel 37 per cent. On the other hand, the targets for increased production of a number of non-ferrous metals were not reached.

To a considerable extent the increased output of non-ferrous metals was achieved by enlarging existing enterprises, intensification of technological processes, and improved utilization of production capacities. During the period the production of metals of high purity was mastered and organized and the proportion of higher grade metals in the total output increased. The level of mechanization of mining operations was increased. In 1955, the removal of ore and rock was mechanized 74 per cent compared with 45 per cent in 1950, while the transport of ore from the stopes was mechanized 92 per cent compared with 65 per cent in 1950. Nevertheless, a considerable amount of manual labour is still employed at ore mines. The U.S.S.R. Council of Ministers for Long-Term Planning state that insufficient measures were carried out for automatizing the work of units at ore-refining and metallurgical enterprises.

West German non-ferrous metal experts, analysing Soviet resources, state that as a result of the expansion of output foreseen by the fifth five-year plan, the U.S.S.R. should be almost independent of copper imports. In zinc and lead, some foreign supplies are still necessary, however, while in tin one-third of Soviet requirements must be covered by imports. These experts estimate current Soviet nickel production at about 45,000 tons annually, which is about one-fifth of world output, and consider that this is probably higher than the present needs of domestic industry. They assign third place to the U.S.S.R. among world producers of aluminium, while the country's magnesium output for 1954 is put at 15,000 tons, a figure exceeded only by U.S. production.

EXTENSIVE TITANIUM DEPOSITS

For several decades the Soviets have used titanium in manufacturing stainless steel, but only since 1952 has the Russian Press published articles on the development and use of the metal.

According to a recent report of the U.S. Bureau of Mines, the Russian deposits of titaniferous material are estimated at 250,000,000 tons, containing 25,000,000 tons of TiO_2. It has also been stated that the U.S.S.R. has extensive deposits in the Urals reported to contain more than 400,000,000 tons of ore, while other large deposits have been discovered in Kirovsk on the Kola Peninsula and near Maruipol in the southern Ukraine. However, rutile rather than ilmenite has been the preferred titanium ore.

Concern was recently caused in the U.S. by the report of a government metallurgist that Russian production of titanium metal was by far the largest in the world. However, the Senate Committee on Interior and Insular Affairs has no information which would confirm an inferred annual production by the Soviets of 95,000 tons of titanium, as reported to *The American Metal Market*. Though the Russian potential production is estimated at 95,000 tons, the actual production is probably very much restricted by lack of facilities. (In 1955 the U.S. produced 7,361 tons of titanium sponge.)

URANIUM PRODUCTION

Announcements regarding Russian targets and achievements under successive five-year plans have remained conspicuously lacking in information regarding uranium occurrences and their exploitation. A few weeks ago, however, it was reported that the U.S.S.R. had offered to supply Egypt with uranium in exchange for cotton, which presumably indicates that ample fuel resources for the requirements of Russia's own atomic programme are in sight. It will be recalled that in 1955 the Soviet Union announced that she would help her allies in setting up nuclear establishments of their own. An Eastern Nuclear Energy Pool has recently been established.

During the war the U.S.S.R. gained possession of the famous Joachimsthal deposits, whence came the uranium ores from which Madame Curie isolated polonium and radium. Mr. Horst K. Schneider, a German chemist now living in the U.S. was formerly on the staff of the Auer Co., which before 1945 was in charge of exploiting radioactive deposits in Joachimsthal. In an article contributed recently to *The Mining Record*, he stated that the extent of the reserves of uranium ore in the Joachimsthal area was still unknown. New shafts are sunk, new tunnels are drilled, new veins discovered every month. The ore found is pitch-

blende with a content of U_3O_8 ranging from a few per cent up to 60 per cent. The veins mostly run fairly level, but steep angles and almost perpendicular veins are not uncommon. Their thickness seldom exceeds 2 in. and their width is rarely more than 6 ft. Little ore is found close to the surface and shafts go down below the 1,000 ft. level.

The old and well-known deposits are now depleted and the Russians have to go deeper and deeper to uncover new veins or smaller pockets. The ore is embedded in igneous rock, most of the machinery is poorly maintained, spare parts are scarce, and progress is slow by American standards, but manpower is cheap and plentiful.

The search for new deposits is being very actively undertaken. Two small deposits are said to exist, one west of Berlin and the other to the south, but they are unlikely to gain any importance.

According to Shimkin* the uranium resources available within the U.S.S.R. itself are confined to low-grade but possibly extensive uranium-vanadium deposits in Central Asia and very small but good betafite deposits from Lake Baikal and other regions north-east to the Aldan Shield. It is possible, however, that as in the U.S. and other Free World countries, prospecting and exploration may have led to important discoveries in recent years.

MODERNIZATION OF GOLD MINES

There appear to have been no official disclosures regarding the progress of gold production, which at the outbreak of the second world war exceeded 5,000,000 oz. One recently published estimate places the current output at a minimum of 12,000,000 oz., equal to about half of the production of the rest of the world. In their *Bullion Review* for 1955, S. Japhet and Co. point out that, whatever the true position, the scale of reserves, output and sales is based on wider considerations than monetary cost. The presence of other valuable metals such as uranium may lead to higher production than would be warranted for gold alone, as in South Africa. The amounts disposed of directly or indirectly through the free market and elsewhere have been no larger than could be disposed of without impairing the basic market price of U.S. $35 per oz. All than can be said with assurance is that the accumulated stock probably exceeds the combined gold holdings of all European countries. Presumably this enormous reserve will be used in due course either for purposes of economic warfare or for financing Russia's own future development.

Until recently the diamond resources of the U.S.S.R. have been insignificant, with the result that between 1941 and 1946 purchases of industrial diamonds in Britain totalled almost £1,500,000. The discovery of rich diamond fields in the Lena Basin, East Siberia, was reported early in March, 1956. It is claimed that the new fields are the largest in the world and that the U.S.S.R., hitherto an importing country, expects to become a leading diamond exporter. The Soviet Minister for Geology has foretold that diamonds will become a large source of income, increasing the Soviet foreign currency funds.

THE FUEL MINERALS

In the coal industry the five-year plan targets were exceeded. Coal output in 1955 amounted to 391,000,000 tons, rising by 50 per cent during the five year period instead of the 43 per cent envisaged by the plan. Nevertheless production, particularly in the European part of the U.S.S.R., lagged behind the increased requirements of the national economy.

Methods of working coal deposits were further improved and there was a considerable increase in opencast mining. Mechanization of coal extraction was developed. The number of coal combines increased during the five-year period by 210 per cent and rock-loading machines by 170 per cent. Automatic and remote control of mining machines and mechanisms was extended. New types of metal and ferro-concrete props were introduced. The use of mobile mechanical props at longwalls has been started. Nevertheless, mechanization of a number of labour-consuming jobs is still inadequate. In many mines and workings the machinery available was not fully utilized.

The five-year plan targets for increasing oil output were also exceeded. Oil output in 1955 amounted to 71,000,000 tons and exceeded the 1950 total by 87 per cent. This rapid progress was achieved by the exploration and exploitation of new deposits and the wide application of advanced methods of operating the oil fields. The Volga and Urals districts' proportion of the total output increased from 29 per cent in 1950 to 57 per cent in 1955. The introduction of the artificial pressure method in exploiting oil-bearing areas was widely developed.

The increase in prospected reserves of rich iron ores during the fifth five-year plan period amounted to 91 per cent of the previously known reserves. Increases recorded for other minerals and metals included copper 31 per cent, lead 98 per cent, bauxite 221 per cent, nickel 94 per cent, tin 133 per cent, molybdenum 69 per cent, mercury 154 per cent, oil 140 per cent, natural gas 222 per cent, and phosphorites 33 per cent. A 58 per cent increase in the capacities of coalfields was assured.

In the Kustanai region a big new ore area was prospected for the development of the iron and steel industry with immense resources of coals and large bauxite reserves. Deposits of iron ore in the Angara-Ilim district of East Siberia were prepared for industrial exploitation. Big reserves of oil were revealed in the Tatar Autonomous Soviet Socialist Republic and other Volga districts, and also in the Bashkir Autonomous S.S.R. Considerable reserves of natural gas were discovered and explored in the Ukraine and in the Stavropol Territory.

THE FUTURE PROGRAMME

Marshal Bulganin told the 20th Party Congress recently that the party had set itself the task of catching and overtaking the most highly developed capitalist countries. He said that in the field of metals the Soviet Union, as the result of the fulfilment of the sixth five-year plan, would, by 1960, produce more steel, electric power, cement and fuel than are at present produced by Britain, France and West Germany together. The sixth five-year plan, according to *Pravda*, must yield not less than a 47 per cent increase in the production of steel, 35 per cent in pig-iron, and 40 per cent in rolled ferrous metal. By 1960 Russia expects to be producing 135,000,000 tons of oil and 600,000,000 tons of coal a year.

The directives call for the creation, on the basis of the Kustanai deposits, of an iron ore industry with an annual capacity of 10,000,000 tons of ore, as well as a large bauxite mine and aluminium plant.

Russian primary aluminium production capacity at the end of 1955 amounted to about 573,000 s.tons, according to an analysis made by *The Metal Bulletin*. New expansion activities indicate that about 358,000 tons of new capacity will have been added by 1960. To this estimate should be added another 110,000 tons to allow for expansion of present plants and for improved production techniques. This would increase the grand total of Soviet capacity to around 1,047,000 tons. With improved recovery processes and reduction of waste of all kinds, it should be possible for Russia to produce about 910,000 tons, which would approximate to the increased production apparently envisaged in the plan.

* Dmitri B. Shimkin, "Minerals, a Key to Soviet Power."

A Mining Process Test Plant

On Tuesday, July 17, 1956, a representative of *The Mining Journal* was one of a party of journalists who visited the Test House of International Combustion Ltd., at Derby. The test plant, described in the following article, was opened recently to allow tests to be conducted on representative consignments of those raw materials necessary for industry and also to predict the size of equipment capable of giving specified throughputs. This testing installation is probably the most comprehensive of its type in the world.

The Test Plant of International Combustion Ltd. is arranged in two sections for wet and dry processing respectively. The equipment comprises a range of pulverizing mills of varying types, air classifying equipment, vacuum filtration plant, continuous centrifuges, hydraulic classifier and thickener, pumps for handling solids in suspension, vibratory screens and feeding devices, together with certain research equipment for studying the heat transfer and other effects of boiler flue gases.

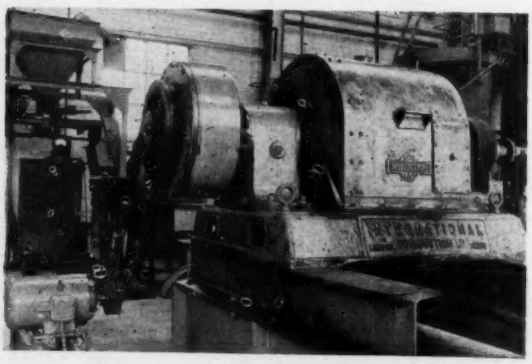
An adjoining sample room contains several thousand specimens of materials which have been tested, data being compiled in each case and filed for record purposes.

WIDE RANGE OF EQUIPMENT

The grinding equipment includes hammer mills, roller mills, ball and rod mills which are generally provided with air classifying equipment except for the wet ball mill which is in circuit with a rake classifier. With this range of machines, materials from the softest to the hardest can be reduced to powders of a high and consistent degree of fineness. The particles of such products are quite frequently required to have a maximum diameter of two thousandths of an inch and in special cases, less than a half thousandth of an inch. Since the dry grinding mills all operate in an air circuit, which is kept at a pressure slightly below atmosphere, there is no emission of these fine products into the atmosphere, an essential requirement.

Where materials are ground in the wet state, in which case the classification is effected by hydraulic means, it becomes necessary to separate the water from the resultant product. For this purpose, a thickener and several rotary vacuum test filters of varying types are installed, capable of dealing with a wide range of substances, but since all materials are not filterable, a new development, the Dynocone, has recently been added.

This is a continuous centrifuge, with operation depending on the principle of accelerated settlement. It employs no filter cloth or screens. The Dynocone consists essentially of a horizontal revolving shell or bowl, frusto-conical in form, inside which a screw conveyor rotates at a slightly higher speed. Providing the material has good settling properties, a product of a high degree of dryness, depending on the particle size, together with an effluent containing little if any solid content, can be obtained continuously.



The Dynocone on test in the Test House

Offices and entrance to the plant of International Combustion Ltd., at Derby

The unit is meeting ready acceptance in the chemical industry for the production of dewatering crystals and in the coal industry where it is used to recover the very fine coal, which has hitherto presented a problem of reclamation.

In the handling of materials suspended in water, the problem of conveyance invariably arises and the pumping of such suspensions has been a matter of considerable difficulty, particularly when the material is of an abrasive nature. To deal with this operation, International Combustion Ltd. some years ago developed the Vacseal pump, which is specially constructed to withstand the rigorous operating conditions imposed on such equipment. Its particular feature is the design of the impeller by which a suction is always maintained at the gland so that solids or deleterious liquids cannot obtain access to the shaft when the pump is in operation. Among many other applications, the Vacseal pump has been extensively adopted in the uranium mines in South Africa, the U.S.A. and Canada in which countries it is manufactured under licence.

Investigations of size separation by screening are provided for by both electrically and mechanically vibrated screens and a range of electrically vibrated equipment for the feeding of materials is also available.

WORK ON FUNDAMENTAL PRINCIPLES

Apart from the applied research with the various machines described, certain work on fundamental principles is carried out, particularly with regard to the behaviour of combustion gases in passing through boiler systems. This work, which has been proceeding over a number of years, has disclosed that sulphuric acid is produced by the passage of products of combustion over heated iron surfaces when the latter are raised to an elevated temperature, due to surface catalysis.

The testing facilities described above are backed by the services of a modern, well-equipped, chemical and physical laboratory, which in addition to controlling the metallurgical quality of the manufactured products, is able to carry out specialized investigations into such matters as particle size analysis, settling rate of suspensions, filterability, and other problems arising with the materials for which the equipment is required. Facilities are provided for particle size measurement by microscopic count, air permeability, sedimentation, elutriation and light extinction methods; whilst for metallurgical problems modern equipment for spectroscopic analyses and X-ray, gamma ray and ultrasonic examination is available.

MACHINERY AND EQUIPMENT

Turbo-Drill Tests in the Netherlands

Tests with a turbo-drilling system, in which the bit is rotated by a turbine, will be carried out in the Netherlands towards the end of this month in an exploration well at the western boundary of the Schoonebeek oilfield in the province of Drenthe. The operating company is N.A.M. in which Shell and Standard Oil of New Jersey participate equally.

Drilling operations with conventional equipment were started a few days ago and are expected to reach a depth of about 1,300 m. by the end of the month. The turbo-drill will be used for penetrating the hard formation below this depth, a bunter sandstone series 1,000 m. thick.

There are advantages and disadvantages in the use of the turbo-drill. The apparatus is vulnerable and the method is more suitable for drilling through hard formations than soft ones. Drilling progress largely depends on the correct combination of the rate at which the mud is pumped downwards and the force with which the apparatus presses on the bottom of the well. It is expected that in hard layers progress with the turbo-drilling system will be very much more rapid than with the normal drilling system. This may result in considerable economies. Moreover, directional drilling, deflecting from the vertical, is easier with the turbo-drill than conventional rig.

A Combined Storage and Conveyor Car for Drifting and Tunnelling

When loading with a shovel type machine from one side of a mine car it is, of course, not possible to fill a car of unlimited size as its height is limited by the height of the loader bucket. The length of the car is also limited by the distance the loader can throw. For operations where it is practical to use larger cars, Atlas Copco have built a combined storage and conveyor car to serve mine cars of 7 cu. m. capacity. The car is designated the U6N71.

At the time of designing this combined storage and conveyor car one of the conditions demanded was that, without any special safety devices, it should be stable when it had a heavy load just at the unloading end although otherwise empty.

Suggestions were made to support the combined storage and conveyor machine against the mine car, or to hook it on to the rail, and the car was designed so that absolute stability was obtained without using any supports. It was with this object in view that the machinery was concentrated as far as possible to one end ensuring that the free hanging section was made as light as possible. It was also necessary to limit the storage capacity to prevent rock or ore becoming too heavy at one end when the car was emptied. In spite of this the car can store about 2.5 cu. m.

The bottom and sides of the car are fitted with wear plates. An endless chain, driven by chain wheels, runs along each side, carriers are mounted between these chains. Two compressed air motors, each of 14 h.p., are used for driving the car and the power from these motors is transferred, via gear wheels and a chain drive to shafts on the side of the car, which finally transfer the power to the chain wheel shafts via a bevel gear.

The total weight of the combined storage and conveyor car is 12 tons.

The Swedish mine, which originally ordered the combined storage and conveyor car, loaded with Atlas Copco LM 200 machines (bucket capacity 16 - 21 cu. ft.) into mine cars (2 cu. m.). As the switching and working conditions were then organized, one round, and in certain cases two rounds, were loaded per shift. Each round weighed 80 tons. Nowadays, three to four rounds are loaded per shift, i.e., 240 to 320 tons.

A Range of Modern Coke Ovens

The basic requirements of a coke oven plant are first, consistent production of the type of coke required; second, robust construction promoting low maintenance costs; third, simplicity of operation; and fourth, economy in fuel consumption. These points are early brought to notice in an interesting brochure describing the underjet ovens made by Simon-Carves Ltd.

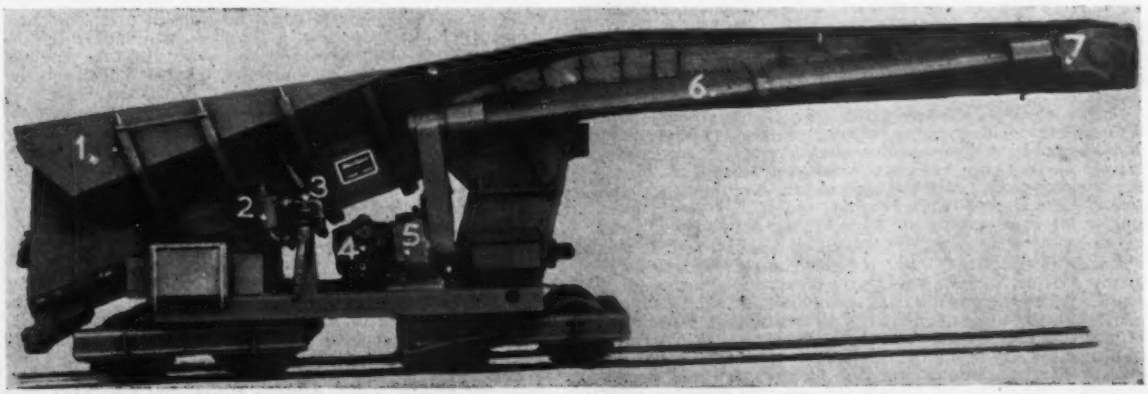
Three present-day types of underjet oven produced by the manufacturers have in common the structural feature that the ovens and regenerators are carried on a reinforced concrete sub-structure comprising raft, pillars and nozzle decking.

The rich gas oven, as its name implies, is designed for heating solely by the coal gas produced in the oven itself during carbonization. The twin-regenerator twin flue compound oven is now the predominant type built by Simon-Carves. It is equally suitable for rich or lean gas firing. The single flue compound oven is designed to simplify the reversing gear by eliminating one set of waste gas valves and one set of lean gas valves.

Among the ancillary equipments described are the Wolff self-sealing oven door, the ray alignment device for coke oven machines, ascension pipes, hydraulic reversing gear and the like.

New Air-Cooled Diesel Engine

The new 20/33 h.p. 3-cylinder air-cooled diesel engine manufactured by Armstrong Siddeley Motors Ltd., is a totally enclosed vertical air-cooled four-cycle direct injection engine designed for industrial purposes. Air cooling permits the engine to be used under all operating temperature conditions with a maximum efficiency and life length. Compression ratio is 15 : 1, engine weight 970 lbs. dry and cubic capacity 180.9 cu. in. The unit conceivably has applications within the mining and quarrying industries.



The Atlas Copco combined storage and conveyor car showing: 1, storage bin; 2, air filter; 3, operating lever for conveyor; 4, air motor for conveyor; 5, gear box; 6, transmission shaft for conveyor and 7, gear box.

MINING MISCELLANY

Two Czech mining experts are reported to be visiting Burma to investigate deposits of lead, zinc and magnesium ores in the Shan State.

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The discovery of rich deposits of copper, lead and zinc in north-western Bulgaria is reported from Vienna. The new finds are in the Stara Planina mountains near Vratza.

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Sir Claude Auchinleck, chairman of Dowsett Holdings, has stated that work is expected to be in full swing in about 12 to 18 months on the titaniferous ore deposits at Bathurst Island, north of Darwin, Australia.

* * *

An ore museum is to be instituted at Lusaka, states the director of the Northern Rhodesia Geological Survey. It will display specimens of the rocks, minerals and ores found all over the territory and will be located in the new £40,000 headquarters of the department.

* * *

A large deposit of titaniferous minerals is reported to have been located near Borburata in the Puerto Cabello district of Venezuela. The discoverer, who is a chemist employed by a cement company at Barqisimeto, has filed claims covering 40,000 hectares.

* * *

David Brown have now built over 100,000 tractors. The 100,000th machine, a standard 25D diesel tractor, was part of a consignment destined for Sweden. This consignment also included the 1,000th David Brown tractor exported to Sweden during the past twelve months.

* * *

President Eisenhower has signed into law the Bill to continue for another 2½ years U.S. Government purchase programmes of tungsten, fluorspar, asbestos and columbium-tantalum. He has also signed a Bill suspending for two years the import duty of $5 per ton on alumina used in the making aluminium.

* * *

Marinduque Iron Mines, Inc., in the Philippines, is shipping 5,500 tons of high grade copper ore to Japan during the current month. The ore averages 18-20 per cent copper and the company has a stockpile of some 20,000 tons which it expects to finish shipping by the end of the year.

* * *

The South American Gold and Platinum Co. has received the first mining concession granted to an American company in Bolivia since 1952 when foreign mining properties in that country were expropriated. Mr. L. B. Harder, president of the company, told stockholders at the annual meeting that the 25-year concessions covered what is believed to be the richest undeveloped placer gold mining area in South America.

* * *

Mining Corporation (Aust.) N.L. reports from Australia that the Mt. Isa drill hole has struck what appears to represent the top of an extension of the copper deposit in the Mt. Isa mine. The hole passed through lode assaying 10.5 per cent copper over a 3 ft. true width from 2,429 ft. to 2,432 ft. Low grade copper was encountered from 1,840 ft. to its present depth of 2,440 ft.

* * *

Blackwood Hodge (Rhodesia) Pty, a member of the Blackwood Hodge (Holdings) group, has received an initial order worth about £200,000 for a fleet of Euclid earth-moving equipments from Impresit (Kariba), the Italian consortium which secured the main constructional contract for the Kariba scheme. The company hopes that this will be the first of a number of orders from Impresit.

* * *

Copper Producers' Association of Australia has been registered in Melbourne "to protect, preserve, promote, and develop the copper industry of Australia." Subscribers include Messrs. G. R. Fisher, chairman of Mt. Isa Mines Ltd.; E. G. Boyd, deputy chairman of Mt. Morgan Ltd.; T. M. Owen, chairman of Lake George Mines Pty. Ltd.; and W. E. Bassett, chairman of Mt. Lyell Mining and Railway Co. Ltd.

* * *

Mining Geophysics Co. and Mogul Mining Corporation will jointly provide $400,000 through an underwriting to finance a new Canadian-sponsored mining operation in Jamaica. Options may eventually bring the financing up to $1,650,000. Jamaican Mining, the new Canadian company, hold through a wholly-owned subsidiary exclusive exploration rights over 500 sq. miles. The concessions are said to cover all the known important indications of copper and iron and the chances of bringing at least one sizeable mine to production are regarded as favourable.

According to *Nepszava*, the Hungarian trade union newspaper, Hungary is to increase coal production to 7,100,000 tons by 1960. It is also planned to open new coal mines with a production capacity of 10,000,000 tons within the same period. It will, therefore, be necessary to employ 15,000 additional miners in the second five year plan. Budapest Radio stated recently that only seven out of 23 mines in the Tatabanya district had fulfilled their planned targets in the first days of July. The total deficit amounted to 10,000 tons.

* * *

A new company has been formed in Canada under the title New Consolidated Canadian Exploration, its authorized capital being $1,000,000. The new company, which will be known as "Newconex," is a wholly-owned subsidiary of Gold Fields American Development, which, in turn, is a wholly-owned subsidiary of Consolidated Gold Fields of South Africa. It will take an active part in the Canadian mining industry, both through exploration and in the financing of mining projects. It is believed that its activities will be concentrated mainly in the Eastern States of Canada, at any rate in the initial stages.

* * *

A major discovery of asbestos is reported to have been made in Newfoundland by Advocate Mines. This company holds a concession over 1,575 sq. miles, covering most of the Burlington Peninsula on the north coast of the island. On the main west showing drilling has already indicated an estimated 65,000 tons per vertical foot, based on a length of approximately 2,500 ft., still open at both ends, and a width of about 285 ft. Two other zones add to the tonnage potential. It is considered possible that the Advocate Concession will be found to embrace a new asbestos field.

PERSONAL

Mr. W. A. Coates has retired from the board of Metropolitan-Vickers Electrical Co. Ltd. He will continue as commercial consultant to the managing director until the end of the year.

* * *

Dr. Clyde Williams, an eminent U.S. scientist and research executive, will address the Trade Promotion Conference and Second Annual Dinner of the Welsh Economic Development Council at Cardiff on October 12, 1956. Dr. Williams is the president and director of Battelle Institute.

* * *

Les Annales des Mines has published a volume of "Statistique de l'Industrie Minérale" covering the years 1952 and 1953. This work forms part of a collection published over more than a century by L'Administration des Mines in which is assembled, in logical form, information relating to the mining industry and its associated industries in Metropolitan France, North Africa and France Overseas.

* * *

About 1,500 publications, including geological reports, preliminary reports, mineral circulars and maps, issued by the Ontario Department of Mines since 1891, are indexed in a revised list of publications which is now ready for public distribution.

CONTRACTS AND TENDERS

Seams sloping from one in one and a half to one in three and a half will be worked at an open-cast contract for the recovery of over 300,000 tons of coal awarded by the National Coal Board (Opencast Executive) to Taylor Woodrow Construction, Ltd., of London and Southall, Middlesex.

The contract, which will take two years to fulfil, is at Moor Farm, near Chesterfield, Derbyshire, and entails the excavation of more than 4,000,000 cu. yds. of soil. There are 16 coal areas on the site and the twelve seams to be worked vary in thickness from 2 ft. 5 in. to 6 ft. 4 in. The maximum high wall varies from 47 ft. to 115 ft.

AGENCIES WANTED

Turner, Hoare and Co. Private Ltd., Gateway Building, Apollo Bunder, Bombay 1, are interested in obtaining the representation, after September 1, 1956, of a U.K. manufacturer of stone crushing equipment. Manufacturers interested should write direct to the Bombay concern, advising the U.K. Trade Commissioner, P.O. Box 815, Mercantile Bank Building, Mahatma Gandhi Road, Bombay No. 1, that they have done so. B.O.T. Ref., ESB/17250/56. Telephone enquiries to Chancery 4411, extension 776.

METALS, MINERALS AND ALLOYS

COPPER.—What with the continuation of the U.S. steel strike and the settlement, this time for a three-year period, of most of the wage negotiations in the copper mining industry it is not surprising that the copper market has been extremely quiet during the past week; nor is it likely that demand will show much strength in advance of the holiday period.

Significantly it has been reported by the Copper Institute this week that for the first time since December, 1940, the stocks of refined copper in manufacturers' hands actually rose during June by 16,000 s.tons to a total of 451,216 s.tons, while at the same time manufacturers' unfilled orders declined sharply to 227,097 s.tons, the smallest backlog for over a year. Mr. Herman Steinkraus, president of the Bridgeport Brass Company, is reported as saying that there has been a virtual buyers' strike in copper products since May with June orders running about 40 per cent below the first quarter average, while the *Wall Street Journal* states this week that it now seems certain that July deliveries to manufacturers will fall well below the June figure and with August showing signs of maintaining about the same slow pace as July.

There is no doubt that the copper price can still go quite a bit lower without hampering production, and probably even at a £250 average basis we would not see much loss from marginal producers. It will, therefore be interesting to see what the American market does in the face of the present easier market. Presumably any further tentative price cuts will again be initiated by the smelters with the producers following. Certainly it is to be assumed, or at all events hoped, that the American producers will have gained wisdom from their unfortunate experience over the premature introduction of output restrictions on the occasion of the last easement of the copper market.

One possible factor which may come to the support of the market is that at both Kennecott's and A.S. and R.'s Garfield refineries wage negotiations are still pending on contracts due to expire at the end of August, while the Phelps-Dodge refinery at Laurel Hill has still to renew its contract ending next week. It is possible that somewhat greater difficulty may be experienced in reaching agreement on these contracts owing to the considerable rivalry between the Steelworkers and Mine-Mill unions for control of these plants, more particularly at Garfield. The Steelworkers have already suffered several defeats this year at the hands of Mine-Mill and this no doubt partly explains their insistence in the current wage negotiation that the copper refineries should receive the same settlement as that eventually to be reached in the steel industry negotiations. It would, of course, be exceedingly difficult for the companies to agree to any such basis in view of the contracts they have already negotiated with Mine-Mill, embodying much more modest increases. A stoppage at the refineries could well reverse the present consumers' inclination to hold off the market as long as stocks will permit.

A meeting on Thursday of last week between the Northern Rhodesian Chamber of Mines and the African Mine Workers' Union in the presence of the Assistant Labour Commissioner failed to reach any accord over the interpretation of the demarcation clause in their Agreement recognizing the right of the African Staff Association to certain categories of workers under the advancement scheme. At the close of the meeting the Union was still taking up the position that the agreement should be so worded as to enable the African Mine Workers' Union to represent all categories of African employees employed by the companies, while the Chamber, which was obviously unable to agree to this, again proposed that the Union should specify those jobs which it felt were wrongly classified as between the Union and the Staff Association.

The United States Commerce Department states that the Chilean Government has authorized investments up to $94,000,000 in addition to $32,000,000 approved in the first 20 months after the enactment of the Chilean law to encourage investment. The investments authorized for 1955-56 include: $37,947,000 by Anaconda at Potrerillos and Chuquicamata; $52,950,000 by Anaconda at the new mine of El Salvador; and $3,736,830 by Braden at El Teniente.

LEAD AND ZINC.—In the States, lead sales have been better than for some time past. Battery manufacturers have provided much of the increased buying, with cable manufacturers and the chemical industry also prominent. The stockpile has again accepted offers of domestic lead this month although the tonnages taken up did not represent the full amounts offered by producers.

With the continuation of the steel strike, zinc has not been an active market although die-casters have come in for some high-grade metal.

Domestic producers are showing some restlessness over the tonnages of lead and zinc reported to have been accepted by Commodity Credit Corporation under recent barter deals. Unofficial estimates put the lead commitment at 35,000 s.tons and the zinc at 100,000 s.tons. While admitting that the government is obtaining this metal in exchange for agricultural commodities it does not want, producers look askance at the simultaneous disinclination of the stockpile to take up all available domesic surplus. Meanwhile the C.C.C. is reported to have stopped barter deals in zinc for the time being.

TIN.—The 25-days strike of miners on the Kampong Gajah property of the Malayan Tin Dredging Company ended yesterday. As the miners returned to work of their own accord without a settlement being reached, this development may bear some relation to the recent warning against unofficial strikes issued by the secretary of the Mining Employees' Union which has been generally interpreted as a clearing of the decks in anticipation of a general stoppage early in August.

As things stand the Union's strike ultimatum expires on July 30. The threatened strike call arises from the refusal of the individual mine managements to open negotiations on the Union's demands for improved wages and conditions. The Union is refusing to negotiate with the Mining Employer's Association through which such negotiations are normally conducted. If a stoppage does occur it might well cause a sharp market reaction more especially if the American Steel strike is settled in the meanwhile.

Whatever the real motivation of the Union's present intransigence, it is not inappropriate to recall Mr. M. W. Warren's recent remarks at the annual meeting of the Malayan Chamber of Mines in London where he pointed out that the mineworkers were among the best paid workers in Malaya, and that a new wage scale had been introduced into the European-owned mines as recently as last December. Generally miners are provided with free housing and other amenities, although Mr. Warren did not indicate the cash equivalent of these benefits.

It is reported from Djakarta that China is showing interest in the purchase of Indonesian tin. An Indonesian trade mission is going to Peking next month. At the moment Indonesian tin exports to China come under the United Nations embargo.

The Texas smelter has now been officially put up for sale. The deal will be handled by the Federal Facilities Corporation which operates the smelter. Bids will be accepted until November 2. The Corporation states that it will consider bids either for the purchase or lease of the smelter alone, or for the smelter with one or both of the other assets of the government's tin programme, i.e., a chemical plant now used for recovering hydrochloric acid, and certain unspecified stocks of tin-bearing materials. As we have had occasion to point out before now, there is no reason why the private operation of the Texas smelter should not be carried on economically; the point is whether private enterprise can aquire the capital assets at a valuation which would enable it do so.

World mine output in May was 14,600 tons against 14,200 in April. Tin stocks at the end of May were 4,081 in Indonesia, 6,900 in Malaya and 7,900 in the U.K.. United States consumption in April was 5,450 tons, the highest since January, 1951. Malayan output of tin ore in June was 5,530 tons against 5,374 tons in May. Output has now continued to rise since April.

ALUMINIUM.—Reports from the U.S. state that supply and demand in primary aluminium appear to be in closer balance than they have been for a year or more, when consumers were scrambling for supplies. The improved position stems from new record output in the first six months of 1956, plus relinquishment of stockpile deliveries, and no increase in third quarter demand. An advance is expected in the fourth quarter, however, and on balance 1956 is likely to show improvement over last year. One source, in fact, predicts renewed tightness in the fourth quarter, persisting into the early part of 1957. The Aluminium Association reports that primary output of aluminium at 860,304 s.tons established a new record with a gain of 13 per cent over output in the corresponding period of last year.

In addition to increased production, about 400,000 tons of the metal have been made available to industry by the relinquishment of scheduled deliveries to the Government this year.

The West German aluminium industry does not expect consumption during the current year to be more than 5 or 6 per cent higher than in 1955, whereas the advance recorded last year was in the region of 23 per cent. This smaller increase is more normal and in line with the annual figures for the U.S. (8 per cent) and Western Europe (6 per cent). Consumption will thus be in the region of 275,000 - 280,000 tonnes this year against 264,000 in 1955, 214,000 in 1954 and 169,000 tons in 1953. If it continues expanding at the recent more moderate pace, it will reach 360,000 tons (civilian) by 1960. Aluminium producers are of the opinion, however, that, compared with other countries, there are still many sectors in Western Germany where more use could be made of this metal. For instance, consumption by the building industry in West Germany is only 6 per cent of the total against 16 per cent in the U.S. and overall consumption 5.1 kilos per capita against 11.5 in the U.S.

CHROME.—The Eti-Bank reports that output of chrome ore showed some improvement in 1955 after the extremely sharp decline recorded between 1953 and 1954. Production rose last year to 640,300 tons, which compares with 561,500 tonnes in 1954, 912,200 in 1953 and 806,900 in 1952. Exports in 1955 totalled 559,580 tonnes, of which 393,700 tonnes went to the U.S., 65,700 to West Germany, and the balance to Austria, France and the U.K.

GERMANIUM.—In the U.S. the General Electric Co. has cut prices an average of 10 per cent on 48 medium power germanium rectifiers. The company states that these devices are now within the price range of equivalent dry rectifiers, such as those made from selenium. The reductions are ascribed to the growing use of germanium rectifiers and the consequent fall in manufacturing costs.

NICKEL.—Diversion of nickel from the U.S. stockpile is at a maximum, amounting to some 34,000 s.tons this year, Mr. H. B. McCoy, Deputy Administrator of the Business and Defence Services Administration, told a Senate Armed Forces Nickel Investigating Sub-Committee. Senator Stuart Symington asked why the Administration continued to stockpile nickel when civilian industry needed it. He suggested that the stockpiling procedure was ill-advised in view of the "huge amount" already in Government stocks "and the hypothesis of some military experts that a future war will be of short duration, making stockpiles unnecessary." Mr. McCoy said that nickel was being furnished to the stockpile by one foreign producer. His statement that stockpile diversion is at a maximum means that very little nickel is going into the stockpile this year. Exact stockpile figures are classified as secret.

Six Japanese nickel refineries have concluded a contract with the French Special Steel Manufacturers' Federation for exports of 470 tons of nickel products for delivery by March, 1957. France originally hoped to purchase a much larger quantity of nickel products from Japan. The contract prices are reported to be $4.40 per kilo c.i.f. Japan for ferro-nickel, $2.15 per lb. c.i.f. Japan for cathode nickel, and $2.05 per lb. for nickel ingot. Officials of INCO have been in Winnipeg for conferences which may lead to the launching of one of the biggest mining developments in Manitoba. Talks are in progress with the Government hydro-electric board on details of the power supply for INCO's property at Mystery Lake, in the Moak Lake area 425 miles north of Winnipeg. The company has studied deposits in this area for two years. Reports indicate the possibility of a combined development project, including a mine, power plant and possible process facilities, which would involve an investment of more than $20,000,000.

Work on the new smelter of Falconbridge Nickel Mines is running behind schedule as a result of slow steel deliveries this year. This plant will be capable of adding 5,000 s.tons of nickel to the company's present annual production of 20,000 tons of metal.

The London Metal Market

(From Our Metal Exchange Correspondent)

Copper has shown a moderate recovery from the low level reached last Wednesday on the London Metal Exchange, and although stocks in official warehouses declined slightly last week the backwardation has tended to narrow and was as little as 10s. per ton at one time. There has been no special feature, demand both on this side of the Atlantic and in America being quiet in view of the approaching works' holidays. The supply position is very much easier and reports show that American copper users have a surplus over requirements for the first time since the latter part of 1940.

There is very little to report in the tin market where price movements have been governed mainly by the day-to-day labour position news from Malaya. There has been some speculative buying because of the Malayan labour outlook, but trade demand is rather quiet. On Thursday morning the Eastern price was equivalent to £775 per ton c.i.f. Europe.

Lead and zinc prices have continued to give way, being influenced by the continuance of the steel strike in the U.S. and the strike of workers in the motor car industry here. In the U.S. buying by lead users has been only fair and rather patchy, while demand for zinc has been quiet. The Commodity Credit Corporation is unofficially reported to have acquired 35,000 s.tons of foreign lead and 100,000 s.tons of foreign zinc in the recent barter deals against surplus agricultural products. The C.C.C. is said to be temporarily out of the market for zinc but still open for lead.

Closing prices and turnovers are given in the following table :—

	July 19		July 26	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Copper				
Cash	£284	£285	£290½	£291
Three months	£283	£284	£289	£289½
Settlement	£285		£291	
Week's turnover	7,150 tons		6,150 tons	
Tin				
Cash	£743	£745	£755	£756
Three months	£742	£743	£753	£754
Settlement	£745		£756	
Week's turnover	635 tons		495 tons	
Lead				
Current half month	£113¾	£114	£112¾	£113
Three months	£112¾	£112½	£111¾	£112
Week's turnover	2,175 tons		2,100 tons	
Zinc				
Current half month	£93½	£93¾	£93½	£93¾
Three months	£92½	£92¾	£92½	£92¾
Week's turnover	3,525 tons		1,575 tons	

OTHER LONDON PRICES — JULY 26

METALS

Aluminium, 99.5%, £190 10s. per ton
Antimony—
English (99%) delivered, 10 cwt. and over £210 per ton
Crude (70%) £200 per ton
Ore (60%) bases 23s. 6d./24s. 6d. nom. per unit, c.i.f.
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 12s. 0d. lb.
Chromium, 6s. 11d. lb.
Cobalt, 21s. lb.
Gold, 251s. 1½d.
Iridium, £29/31 oz.
Manganese Metal (96%-98%) £259/£265 according to quantity
Magnesium, 2s. 4d. lb.
Nickel, 99.5% (home trade) £519 per ton
Osmium, £24/27 oz. nom.
Osmiridium, nom.
Palladium, £8 0s./£8 10s. oz.
Platinum U.K. and Empire Refined £34/£35 oz. Imported £37 0s. nom.
Rhodium, £42.
Ruthenium, £15/£17 oz.
Quicksilver, £84 10s. ex-warehouse
Selenium, 112s. nom. per lb.
Silver, 78¾d. f.oz. spot and 78¼ f'd.
Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth	60% 8s. 3d. c.i.f. 30% 5s. 0d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semi-friable) 48%	£16 15s. 0d. per ton c.i.f.
,, Hard Lumpy (45%)	£16 15s. 0d.
,, Refractory 40%	£10 15s. 0d. per ton c.i.f.
,, Smalls 42%	£13 15s. 0d. per ton c.i.f.
Baluchistan	£17 5s. 0d. c.i.f.
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite, Raw (ground)	£21 0s./£22 0s. d/d
Molybdenite (85% basis)	8s. 2½d. nom. per lb. (f.o.b.)
Wolfram and Scheelite (65%)	250s. 0d./255s. 0d. c.i.f.
Tungsten Metal Powder (98% Min. W.)	20s. 4d. nom. per lb. (home)
Ferro-tungsten (80%-85%)	17s. 4d. nom. per lb. (home)
Carbide, 4-cwt. lots	£41 3s. 9d. d/d per ton
Ferro-manganese, home	£66 per ton
Manganese Ore Indian Europe (46%-48%) basis 125s. freight	105d./106d. per unit c.i.f.
Manganese Ore(43%-45%)	98d./99d. per unit c.i.f.
Manganese Ore (38%/40%)	92d. per unit
Brass Wire	2s. 10⅞d. per lb. basis
Brass Tubes, solid drawn	2s. 3¼d. per lb. basis

COMPANY NEWS AND VIEWS

An Uneventful Week on Stock Markets

During the period July 19 to July 25 Wall Street was more concerned with consolidating its recent gains than making headway towards the all-time peak now less than seven points away. Under these conditions the *Dow Jones Industrial Index* made only a small increase from 513.86 to 514.13. On the other hand the *Rails Index* made a better showing by rising from 168.25 to 171.37. Generally speaking, news during the week was favourable. Reports that resumed talks to establish fresh wages contract for the U.S. steel industry were making encouraging headway provided an important influence on sentiment. It was, no doubt, a consideration which boosted the *Rails Index*. Besides this, favourable six months earning returns helped the market to shelve its fears regarding President Eisenhower's health.

London markets acted in very much the same way and the *Financial Times Industrial Index* gained one point to 185.1. Little notice was taken of gradually deteriorating conditions in the motor industry strike, while the Chancellor's appeal to Banks to maintain strict credit control was not taken too badly. Some institutional investment demand was reported, but trading volume was generally restricted.

Although little selling of Kaffirs was reported, these issues appeared to have lost momentum. In view of the good quarterly reports this was regarded as disappointing. Nevertheless price gains established over past weeks were maintained, and some good features appeared. These included strong markets in F.S. Geduld and Loraine together with considerable demand for F.S. Development on hopes that an announcement of good drilling results from exploration work south of Randfontein on the western Rand would soon be made. Dominion Reefs were a good spot on the new tax position under which the company is to be regarded as an uranium producer rather than a gold mine. Sterling weaknesses during the week assisted gold shares as a whole and particularly the older producers. The gold price yesterday reached 251s. 1½d. Reflecting the strength of Wall Street, coppers were in favour. One or two exceptionally good features developed in this section including rises in both Bancroft and Rho-Kats. Pending progress reports were responsible in both cases.

Sir E. Oppenheimer on the Copper Price Outlook

In his review of operations carried out by Nchanga Consolidated Copper Mines during the year ended March 31, 1956, Sir Ernest Oppenheimer, the chairman, made some most interesting comments regarding the outlook for copper prices. there was every reason to hope, said Sir Ernest, that such wide fluctuations as had occurred during the company's past financial year would not recur, and that the market would settle down at a level, which besides satisfying consumers, would also provide a fair margin of profit to producers. The company's expectations, he pointed out, could not reasonably be based on a return to peak prices reached during the first months of the current year. In the circumstances, the year 1955-56—during which an average price of £370 was received for copper—must be regarded as exceptional. Total net profits after taxation earned by Nchanga during the twelve months in question at £16,219,713, compared with the previous years figure of £10,181,940. After placing £3,500,000 to general reserve tnd appropriating £3,000,000 for capital expenditure, dividends absorbed £10,500,000 against £7,875,000 and unappropriated profits rose to £925,445 from £830,732.

The large appropriation to general reserve, Sir Ernest stressed was desirable in view of commitments undertaken to assist the Government with loans for general development in the Federation including in particular the Kariba Project. The importance to the Federation, and to copper mining companies, of the Kariba project could not, he said, be over-emphasised.

The King Edward property, situated 25 miles west of Luska, covers a small deposit of ore carrying relatively low copper values but a high sulphur content. It was acquired by the

LONDON STOCK EXCHANGE PRICES — JULY 19 - JULY 25, 1956

Finance	Price July 25	+ or — on week
African & European	3½	.....
Anglo American Corpn.	8	+¼
Anglo-French	22/-	+6d
Anglo-Transvaal Consol.	1⅛	.....
Central Mining (£1 shrs.)	51/9	+3d
Consolidated G'fields	58/6	+1/-
Consol. Mines Selection	1⅝	.....
East Rand Consols	2/-	.....
General Mining	4	.....
H.E. Prop.	9/6	+7½d
Johnnies	41/-	+1/-
Rand Mines	3⅛	—⅛
Rand Selection	1⅝	—⅛
Union Corporation	39/10½	—7½d
Vereeniging Estates	4½	.....
Writs	1⅜	.....
West Wits.	38/6	—6d
Rand Gold		
Blyvoors	21/9	—6d
Brakpan	5/9	.....
Buffelsfontein	26/10½	—10½d
City Deep	10/3	.....
Consol. Main Reef	⅝	.....
Crown	1⅜	—⅛
Daggas	2⅞	.....
Dominion Reefs	18/3	+1/-
Doornfontein	21/9	—3d
Durban Deep	1½	+⅛
E. Champs	2/9	.....
E. Daggas	9/-	.....
E. Geduld (4s. units)	29/-	—3d.
E. Rand Props.	47/6	—1/1½
Geduld	3⅛	+⅛
Govt. Areas	3/6	—3d
Grootvlei	18/10½	.....
Hartebeestfontein	39/3	—9d
Libanon	7/1½	+1½d
Luipards Vlei	13/3	—6d
Marievale	20/1½	.....
New Kleinfontein	3/7½	—3d
New Pioneer	15/1½	.....
Randfontein	39/6	—2/-
Robinson Deep	8/3	+3d
Rose Deep	8/6	.....
Simmer & Jack	3/6	—1½d
S.A. Lands	1⅛	+⅛
Springs	2/6	.....
Sülfontein	25/-	4½d
Sub Nigel	1½	—⅛
Vaal Reefs	32/-	—9d
Van Dyk	2/7½	+4½d
Venterspost	13/-	—1½d
Vlakfontein	17/4½	—3d
Vogelstruisbult	18/-	+10½d
West Driefontein	5⅛	—⅛
Rand Gold contd.		
W. Rand Consolidated	1⅜	+⅛
Western Reefs	29/6	—6d
O.F.S. Gold		
Freddies	8/3	+6d
Freddies Consolidated	4/-	.....
F.S. Geduld	4⅛	+⅛
Geoffries	8/3	—1½d
Harmony	25/-	—6d
Loraine	6/9	+3d
Lydenburg Estates	18/-	—9d
Merriespruit	8/3	—1½d
Middle Wits	12/4½	—4½d
Ofsits	62/7½	—1/4½
President Brand	58/9	—1/3
President Steyn	32/-	—3d
St. Helena	29/6	.....
Virginia Ord.	10/-	—3d
Welkom	21/-	—6d
Western Holdings	3⅜	—⅛
West African Gold		
Amalgamated Banket	1/4½	.....
Ariston	4/-	—1½d
Ashanti	16/3	—9d
Bibiani	2/4½	+1½d
Bremang	1/5½	.....
G.C. Main Reef	1/4½	.....
Konongo	1/6½	—2½d
Marlu	1½d	.....
Taquah	1/6½	.....
Western Selection	7/3	—3d
Australian Gold		
Gold Mines of Kalgoorlie	13/1½	+1½d
Great Boulder Prop.	12/-	+3d
Lake View & Star	16/4½	+6d
Mount Morgan	20/6	.....
North Kalgurli	7/3	+1½d
Sons of Gwalia	2/10½	+1½d
Western Mining	9/10½	+1½d
Miscellaneous Gold		
Cam & Motor	8/-	.....
Champion Reef	6/6	.....
Falcon Mines	8/-	.....
Globe & Phoenix	25/9	—6d
Motapa	10½d	.....
Mysore	3/7½	.....
Nundydroog	9/9	.....
St. John d'El Rey	32/6	+4/9
Zaaiwater	2⅜	.....
Diamonds and Platinum		
Anglo American Inv.	8⅞	+⅛
Casts	22/7½	+3d
Cons. Diam. of S.W.A.	10/6	.....
De Beers Defd. Regd.	5⅜	—⅛
De Beers Pfd. Regd.	13½	—⅛
Pots Platinum	12/10½	.....
Waterval	22/-	+3d
Copper		
Bancroft	50/7½	+1/10½
Chartered	71/3	+9d
Esperanza	3/1½	—1½d
Messina	8⅞	+⅛
Nchanga	12⅛	—⅛
Rhod. Anglo-American	5⅛	+⅛
Rhod. Katanga	31/6	+4/3
Rhodesian Selection	47/6	—3d
Rhokana	39½	+1½
Rio Tinto	3¼	+⅛
Roan Antelope	25/7½	—1/1½
Selection Trust	4⅛ xc	—⅛
Tanks	7⅛	—⅛
Tharsis Sulphur Br.	4½	.....
Tin (Eastern)		
Ayer Hitam	20/9	+6d
Gopeng	9/9	.....
Hongkong	5/4½	.....
Ipoh	23/6	.....
Kamunting	7/10½	+1½d
Kepong Dredging	3/1¼	.....
Kinta Tin Mines	15/3	.....
Malayan Dredging	9/9	+3d
Pahang	11/4½	.....
Pengkalen	13/6	.....
Petaling	7/9	.....
Rambutan	25/- xd	.....
Siamese Tin	8/9	—1½d
Southern Kinta	14/4½	.....
S. Malayan	7/4½	+6d
S. Tronoh	5/9	.....
Sungei Kinta	14/-	.....
Tekka Taiping	5/9	—7½d
Tronoh	9/-	.....
Tin (Nigerian and Miscellaneous)		
Amalgamated Tin	10/3	.....
Beralt Tin	45/9	+1/6
Bisichi	4/1½	.....
British Tin Inv.	21/3 xd	.....
Ex-Lands Nigeria	2/-	—1½d
Geevor Tin	15/6	+3d
Tin (Nigerian and Miscellaneous) contd.		
Gold & Base Metal	1/1½	—1½d
Jantar Nigeria	4/6	.....
Jos Tin Area	12/3	.....
Kaduna Prospectors	1/6	.....
Kaduna Syndicate	2/4½	.....
London Tin	9/4½	+3d
United Tin	10½d	.....
Silver, Lead, Zinc		
Broken Hill South	59/6	+6d
Burma Mines	4/7½	.....
Consol. Zinc	48/9	+9d
Lake George	13/9	+4½d
Mount Isa	19/10½	—4½d
New Broken Hill	39/9	.....
North Broken Hill	4⅛	—⅛
Rhodesian Broken Hill	11/-	+3d
San Francisco Mines	23/9	+3d
Uruwira	5/6	+6d
Miscellaneous Base Metals and Coal		
Amal. Collieries of S.A.	45/6	—6d
Associated Manganese	35/9	+3d
Cape Asbestos	9/9	—1½d
C.P. Manganese	28/-	.....
Consol. Murchison	2⅜	+⅛
Natal Navigation	60/-	—1/-
Turner & Newall	107/6	+2/-
Wankie	17/6	.....
Witbank Colliery	5	+⅛
Canadian Mines		
Dome	$27	+1
Hollinger	$54½	.....
Hudson Bay Mining	$176	+2
International Nickel	$188½	+2½
Mining Corpn. of Canada	£9⅛	.....
Noranda	$114	+1½
Quemont	£10½	+⅛
Yukon	4/7½	—1½d
Oil		
Apex	38/3	—1/-
Attock	38/-	—6d
British Petroleum	175/7½	—5/7½
Burmah	113/1½	—2/6
Canadian Eagle	63/9	—3/-
Mexican Eagle	21/9	+6/-
Shell	8½	—⅛
Trinidad Oil	75/10½	+7½d
T.P.D.	46/3	—2/3
Ultramar	41/3	—2/3

company in 1937 with the idea that it might prove a source of sulphuric acid for use in the treatment of oxidized Nchanga ore. It has not in fact been necessary to exploit this idea, but it was, nevertheless, decided in 1951 to reassess the potentialities of the deposit. A comprehensive programme of drilling and underground development has been carried out over the last five years, and it is provisionally estimated that ore reserves amount to 3,200,000 tons, averaging 2.09 per cent copper, 25.9 per cent iron and 19.1 per cent sulphur. Exploration work has now been stopped. Metallurgical research is being undertaken and the economic potentialities of the property are being studied. In the balance sheet the fixed asset worth of the mine is given at £185,257 against £126,020 a year ago.

Nchanga's consolidated balance sheet at March 31, 1956, revealed an expansion in total assets to £52,919,841 from £38,972,238. Most notable gain was that under the heading of current assets which moved up to £27,216,927 from £15,905,762. Meeting, Salisbury, Southern Rhodesia, August 15.

Rio Tinto Secures World's Largest Uranium Contract

Northspan Mines, which is under the management of the Rio Tinto Mining Company of Canada, has been awarded the world's largest single uranium mining contract.

Northspan Mines, registered in Canada on June 29 last, is in the Blind River area. The company has received a letter of intent for the purchase of $242,416,000, equivalent to £86,600,000, of uranium oxide to be produced at a daily milling rate of 9,000 tons of ore. Negotiations are proceeding for the financing of approximately $70,000,000, the largest individual mine financing operation in the history of Canada. This contract brings the total value of contracts held by the Rio Tinto Company of Canada for the companies under its management to over $500,000,000.

S.W. Africa Company Reports Favourable Drilling Results

A quarterly report from The South West Africa Company, covering operations for three months ended June 30, 1956, reveals that diamond drilling ahead of development at the Abenab West mine has disclosed massive lead-zinc sulphide ore on, and 50 ft. below, the 1,000 ft. level over a horizontal strike distance of 130 ft. Further underground drilling is in progress. In view of these favourable results it has been decided to sink the Malcolm Shaft a further 250 ft. to the 1,250 ft. level. Production at Abendab during the past quarter amounted to 341 tons of lead and 88 tons of vanadium pentoxide. This output, which resulted almost entirely from the treatment of old tailings dumps, compared with the previous quarter's figure of 465 tons of lead and 124 tons of vanadium. It will be recalled that a fall in output had previously been forecast.

Output of lead and zinc at Abenab during the same period amounted to 516 tons and 953 tons respectively. These tonnages represented initial output figures in respect of lead-zinc sulphides.

Lead-vanadium production at Berg Aukus Mine amounted to 120 tons of lead (64 tons) and 48 tons of vanadium pentoxide (27 tons). At Brandberg West, an alteration in production methods resulted in a greatly improved production at 52.2 tons of tin (32.2 tons) and 33.6 tons of tungsten oxide (18.5 tons). A further improvement is anticipated on delivery of additional transport equipment. A report in respect of the Baltika Mine states that underground development was continued but that the installation of a pilot treatment plant has been postponed in favour of more rapid development of high-grade ores disclosed a Berg Aukas.

National Mining's Investment Values Decline

Balance sheet figures of The National Mining Corporation at March 31, 1956, revealed quoted investments at a market valuation of £270,220 compared with the previous year's figure of £300,706. Book entry for these securities at £255,233 was, however, virtually the same as the preceding year's figure of £258,799. A decline in current assets to £23,310 took place from £33,155, but total assets at £413,190 were little changed from the 1955 figure of £411,012. During its past financial year National Mining made net profits of £21,822 against £35,583. After a dividend of 10 per cent which absorbed £19,568 (same) total unappropriated profits of £25,156 (£22,902), remained to be carried forward.

Welgedacht to Close Down

Owing to working losses incurred during the months of May and June, 1956; to the depletion of payable ore reserves, and to poor values obtained at the mine, operations are to cease at Welgedacht Exploration Company with effect from July 28. General clean-up operations underground and on the surface will continue thereafter for a few months. With the approval of the Trustees to the Debenture holders, the company will not be placed in liquidation, but will continue in existence for the purpose of realizing its remaining property and assets.

Tehidy Minerals in 1955

Total assets at December 31, 1955, amounted to £98,926 against £96,834 previously. Current assets included £80,242 (£72,585) representing book value of investments which had a market worth of £90,995. During the past financial year the company made net profits after tax of £8,060 (£5,685). After dividends of 15 per cent. on the issued capital of £73,500 which absorbed £6,339 (£6,247), the balance unappropriated rose to £19,124 from £17,403. Mr. D. W. Thomas is chairman.

Derbyshire Stone and Matlock Lead Mines

A section of Mr. John Hadfield's statement to shareholders of Derbyshire Stone in respect of the 15 months ended March 31, 1956, concerned the Matlock Lead Mines which is now a wholly owned subsidiary. It will be recalled that the principal asset of Matlock Lead Mines is a well equipped mine in which 20,000 tons of lead ore estimated to contain 6 per cent lead have already been blocked out. While exploration and development continues, extraction of ore is expected to commence soon.

Consolidated Tin Smelters Earn More But Pays Same.—Profits after tax of £682,489 (£582,224) earned by Consolidated Tin Smelters during the year ended March 31, 1956, moved up to £557,569 from £510,376. By announcing a dividend of 15 per cent the company has maintained its distribution at the level of the previous year. Mr. C. Waite is chairman.

Progress of Bid for Stream-Line.—Stream-Line Filters announces progress with negotiations regarding the recent tentative offer of 55s. per share for its capital. The board expects to be in a position to make a definite statement not later than the end of July.

HENDERSON'S TRANSVAAL ESTATES

DIVIDEND MAINTAINED AT 15 PER CENT

The 44th annual general meeting of Henderson's Transvaal Estates, Limited, was held on July 24 in London.

Sir Joseph Ball, K.B.E. (the Chairman) presided and, in the course of his speech, said : The results for the past year disclose little variation from those for the previous year.

Dealing first with the Company's own Accounts, you will have noted that the profit for the year, before taxation, amounted to £88,225, as compared with £77,508 for the previous year. From this sum has to be deducted £41,708 in respect of taxation, leaving a net profit of £46,517.

To the net profit of £46,517 must be added a balance of £74,070 brought forward, making an available total of £120,587. Your directors now recommend a first and final dividend of 15%, less tax, and there will remain a balance of £71,988 to be carried forward.

Turning now to the Consolidated Accounts, the profit before taxation, at £219,870, was approximately £40,400 higher than in the previous year, and after providing for depreciation and taxation the net profit amounted to £103,447—the comparable figure for last year being £78,462.

The results of our Subsidiary Company, Tweefontein United Collieries, Limited, for the year ended December 31, 1955, showed a profit on coal, after provision for working expenses, replacements and renewals and selling commission, of £146,949, as compared with £141,915 for the previous year—an increase of some £5,000.

Output of coal, at 1,352,292 tons, also showed a small increase over that for the previous year, viz., 1,315,496 tons.

The larger profit is due, in part, to an increase in the price of coal which was authorized by the Price Controller in November last. The full effect of this increase was only reflected in the results for the last two months of the Company's financial year, and the benefit from this source will naturally be much greater during the current year.

We continue to hold our substantial investment in White's South African Portland Cement Company Limited, which Company further expanded both its output and its profits.

The report was adopted.

NCHANGA CONSOLIDATED COPPER MINES LIMITED

SIR ERNEST OPPENHEIMER EMPHASIZES IMPORTANCE OF THE KARIBA PROJECT

URGENT NEED FOR BETTER AFRICAN EDUCATION

The Nineteenth Annual General Meeting of Nchanga Consolidated Copper Mines Limited will be held on August 15 in Salisbury, Southern Rhodesia.

The following is the statement by the Chairman, **Sir Ernest Oppenheimer,** which has been circulated with the annual report and accounts :—

The price of copper on the London Metal Exchange rose by over £100 per ton during the company's last financial year, to the peak figure of £436 in March, 1956, with an average of £370 for the year. Since then the fall in price has been even more marked and prices under £300 per ton were recorded.

AN EXCEPTIONAL YEAR

I believe that there is reason to hope that such wide fluctuations in price will not recur and that the market will settle down at a level which will satisfy consumers and also provide a fair margin of profit to producers. We cannot reasonably base our expectations on a return to the peak prices reached in the first months of 1956. In the circumstances, the year under review must be regarded as exceptional but, from our company's point of view, the high profits were most propitious in that we were able to recommend dividends totalling 30s. net after providing £3,000,000 for capital expenditure and transferring £3,500,000 to general reserve. We regard this reserve appropriation as desirable, in view of the commitments we have undertaken to assist the Government with loans for the general development of the Federation, including in particular the Kariba project.

The importance to the Federation as a whole, and the copper mining companies in particular, of the Kariba hydro-electric project cannot be over-emphasized, and I am therefore happy that the Federal Government has, with our help, been able to raise the large amount required to build the dam and equip the first phase of the power station there. Had there been any obstacle to proceeding with this undertaking, alternative means of providing this essential power at considerable cost would have been the sole responsibility of the copper mining companies. Strict adherence to the programme of construction for Kariba clearly remains of the utmost importance.

Should there be any delay in the delivery of power from this source beyond the beginning of 1960, there will be a rapidly increasing shortage of power on the Copperbelt and production of copper might have to be curtailed. It is on the strength of receiving power from Kariba early in 1960 that the new mines on the Copperbelt are being equipped and the mining programme at your mine is being planned.

PROGRESS EXCEEDS EXPECTATIONS

Meanwhile, progress made in connexion with the importation of power from the Belgian Congo has exceeded our expectations and it is now confidently anticipated that supplies will be forthcoming from this source before the end of 1956, which is some months earlier than was originally planned. This achievement reflects great credit on both Union Miniere du Haut Katanga and Rhodesia Congo Border Power Corporation.

Training of African employees to fill the 24 categories of jobs handed over by European employees in terms of the Advancement agreement signed in September, 1955, has proceeded satisfactorily, and we contemplate that this first phase of advancement will be completed before the end of the present financial year when about 185 Africans will have taken up advanced positions on our property.

I am convinced that we have made the correct decision in proceeding with the gradual advancement of our African employees, and we think the agreement reached is being implemented at a pace which meets the reasonable aspirations of the Africans and is at the same time compatible with the efficient conduct of operations. I sincerely trust that our European employees, who have so far readily conceded the wisdom of this advancement policy, will continue to co-operate in carrying it out, and will not be over-hasty in judging the results. Similarly, I trust that those Africans who are placed in advanced jobs will readily accept their new responsibilities and demonstrate the same integrity and loyalty as we expect from our European employees.

NEED FOR AFRICAN EDUCATION

Advancement inevitably creates demands for increasing amenities so that community life can keep pace with economic progress. We have accordingly been examining the requirements of the African community on the Copperbelt, and have reached the conclusion that urgent attention should be given to improving African education, which, we think, is inadequate in present circumstances. While, naturally, the major responsibility must rest on the Government, which we are confident is doing its best to keep pace with the rapidly expanding need, we are also of the opinion that the copper mining companies should accept a share of the responsibility for dealing with a situation which has largely been occasioned by the expansion of their operations. We are, accordingly, examining the whole question to see in what way and to what extent we can help.

I should like to pay tribute to the general manager and his staff on the mine, who have rendered valuable service in a particularly important year when the preparations for opencast mining called for additional efforts from employees. Close attention has been given to developments at the mine by the company's consulting engineers, Anglo American Corporation of South Africa Limited, who since January 1, 1956, have been providing their services to the company from their office in Salisbury. This arrangement is already proving beneficial not only in that the consulting engineers are now so much closer to the Copperbelt but also because of the advantages of their office being in the capital of the Federation.

It is with regret that the board accepted the resignation of Mr. H. E. Nelems, our general manager since September 1, 1954. He carries with him to Canada our thanks for his outstanding services to us and our best wishes in his new position. I am happy to welcome as his successor Mr. Lawrence Allen, whose record of service on the Copperbelt, latterly as manager of Rhokana Corporation, fits him admirably for his new task.

The report and accounts have been posted to all stockholders. Other persons who are interested may obtain copies from the Head Office of the Company, Kitwe, Northern Rhodesia, or from the Transfer Offices at 44 Main Street, Johannesburg, or 40 Holborn Viaduct, London, E.C.1.

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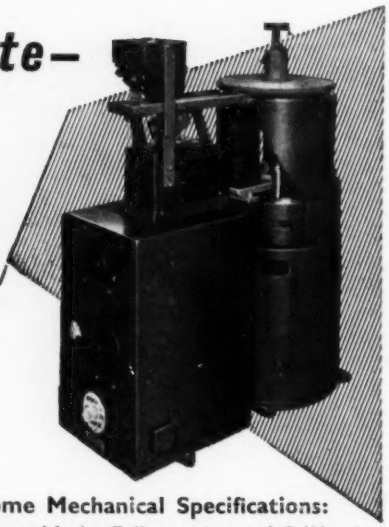

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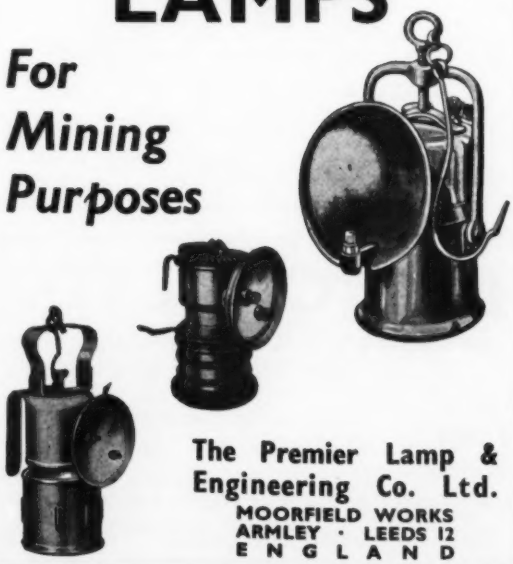

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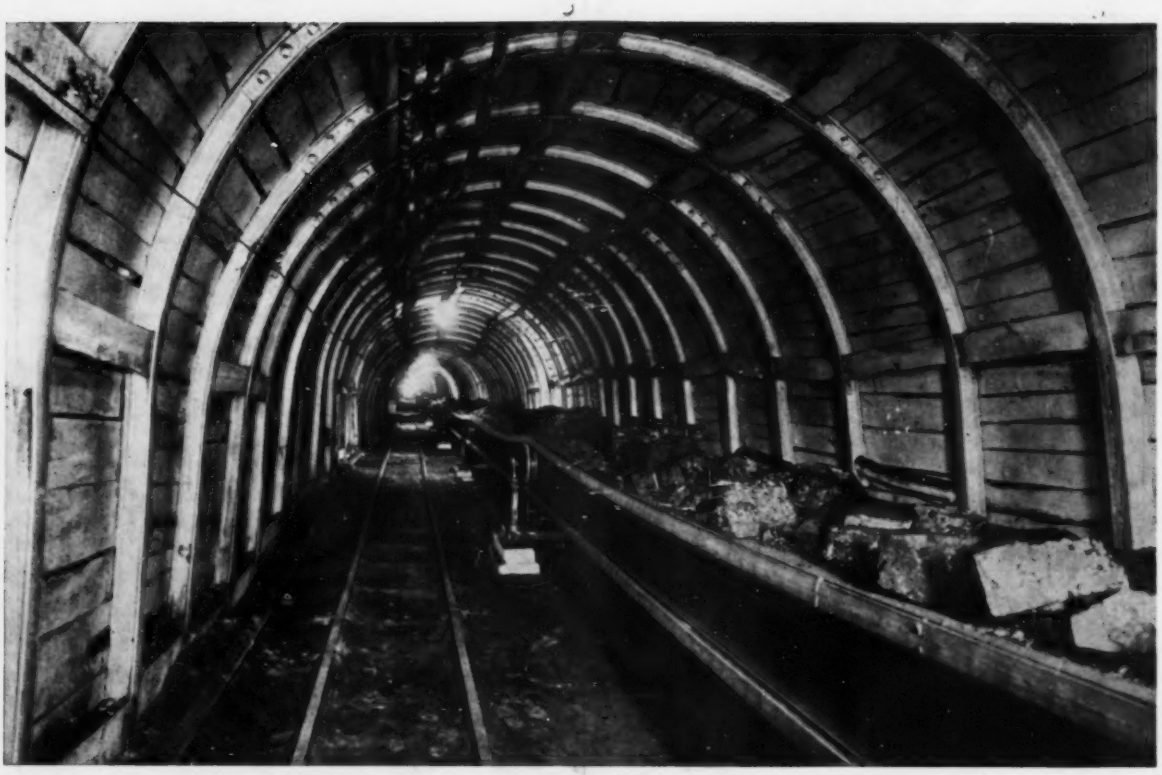

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